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FOOD TECHNOLOGY ABSTRACTS

Volume 21 No.9
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GENERAL

- 2233 CALLOWAY (DH). Concentrated foods for the armed forces: An historical perspective. **Activities Rep. R & D Assoc.** 38(1); 1986; 64-8
Discusses: Historical background; concentration by modified composition; barriers to utilization of high fat rations; digestibility and tolerance. BSN
- 2234 SEXTON (EW). First article: A standard for production, processing and quality of meal, ready-to-eat (MRE) and tray pack items. **Activities Rep. R & D Assoc.** 38(1); 1986; 91-3
Discusses: First article and its role; risk avoidance; specification of quality criteria; submission requirement; testing and evaluation; and establishment of quality standards. BSN
- 2235 GUPTA (SS) and McDONALD (GC). A statistical selection approach to binomial models. **J. Quality. Technol.** 18(2); 1986; 103-15
- 2236 JOHNSON (NL), KOTZ (S) and RODRIGUEZ (RN). Statistical effects of imperfect inspection sampling. II. Double sampling and link sampling. **J. Quality. Technol.** 18(2); 1986; 116-32

FOOD PROCESSING AND PACKAGING

Processing

- 2237 CASIMIR (DJ) and LANG (TR). Counter-current extraction of food industry wastes. **Asean Food J.** 1(4); 1985; 173-5
Discusses the efficient counter-current contacting of the solid and liquid phases during extraction of apple grapes and mushroom residues, as well as poultry and fish and crustacean residues. BSN

Packaging

- 2238 SINGER (M). Packaging: You will be living with in the year 2000. **Activities Rep. R & D Assoc.** 38(1); 1986; 31-4
- 2239 SIDHANTY (AR). Role of flexible laminated in food packaging. **Perfect-pac.** 26(1); 1986; 5-12
First, the author has briefly mentioned the packaging requirements of a few types of dehydrated foods, freshly baked products, fruits and vegetables, and dairy products. He has then outlined the properties of flexible laminates available in India, and presented data (in the form of tables) on their compatibility with various drugs and food products, their properties, and their economic viability. KMD
- 2240 HERSOM (AC). Aseptic processing and packaging of food (Review). **Food Rev. Int.** 1(2); 1985; 215-70
Discusses: History; principles of HTST sterilization; microbiology; engineering principles; UHT processing systems; indirect systems; direct systems; other types; packaging systems; can systems; bottle systems; sachet or pouch system; cup system; carton systems; and bulk packaging. BSN

- 2241 SHARP (AK), BANKS (HJ) and IRVING (AR). The effect of age on the gas-tightness of iso freight containers. *J. Food Process Eng.* 8(2); 1986; 65-80

FOOD ENGINEERING AND EQUIPMENT

- 2242 BOHLMANN (S), KAPLICK (K), KLODEN (W), RITTER (C) and KOCHAN (A). About the application of the modelling by classification for processes of the food industry. *Lebensmittelindustrie.* 32(2); 1985; 62-5
- 2243 SCHLEUSENER (H), BRETSCHNEIDER (U) and SIELAFF (H). Ascertainment of the temperature behaviour in foodstuffs. *Lebensmittelindustrie.* 32(2); 1985; 57-9 (German)
- 2244 PULZ (O), PETZOLD (H) and WALTER (U). Fluidization - an effective process in food production. *Lebensmittelindustrie.* 32(2); 1985; 55-6 (German)
- 2245 AYOUB (JA). Drying foods by "Decanting": A new microwave-vacuum technique. *Activities Rep. R & D Assoc.* 38(1); 1986; 49-55
Discusses: the design construction and operational principles of a new-microwave vacuum freeze dryer named Decanter (dual energy, computer assisted, nominal temperature and evaporation regulation). BSN
- 2246 LEVINE (L), SYMES (S) and WEIMER (J). Automatic control of moisture in food extruders. *J. Food Process Eng.* 8(2); 1986; 97-115
Discusses: objectives; process models; control models; control scheme; comparison of an ideal dead time compensator to convention feed back control; and performance of the real dead time compensator. BSN
- 2247 ROBERTS (SA) and GUY (RCE). Instabilities in an extrusion-cooker: A simple model. *J. Food Eng.* 5(1); 1986; 7-30
A simplified model of an extrusion-cooker is derived which reproduces the low frequency periodic instability found under some extrusion conditions. The essential components of the model and a finite-size cavity behind the die and a fluid whose viscosity is significantly reduced by the action of shear forces. KAR
- 2248 BARRETT (MA). Maximizing caloric density by vacuum infusion of porous foods. *Activities Rep. R & D Assoc.* 38(1); 1986; 56-63
Discusses: Infusion process; porosity; particle size analysis and viscosity effects. BSN

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

- 2249 CURDA (D). About the characterization of the oxygen sensitivity of foodstuffs. *Lebensmittelindustrie.* 32(2); 1985; 60-61 (German)
- 2250 MORI (T), NAKAMURA (T) and SHIUTSUMI (S). Behaviour of intermolecular bond formation in the late stage of heat-induced gelation of glycinin. *J. Agric. Food Chem.* 34(1); 1986; 33-6

- 2251 MAZZOLA (EP), PHILLIPPY (BQ), HARLAND (BF), MILLER (TH), POTEIRA (JM) and KATSIMPRIS (EW). Phosphorus-31 nuclear magnetic resonance spectroscopic determination of phytate in foods. *J. Agric. Food Chem.* 34(1); 1986; 60-62

A direct quantitative method for the determination of phytate in foods, using phosphorus-31 Fourier transform nuclear magnetic resonance spectroscopy, has been substantially modified to improve its convenience and accuracy and eliminate interference from paramagnetic ions. An ion chromatographic method for phytate has also been employed, and good agreement was obtained between the two procedures. AA

- 2252 KIM (H-J). Sulphites in foods: The search for alternatives. *Activities Rep. R & D Assoc.* 38(1); 1986; 35-40

Discusses: Sulphite substitutes for fresh fruits and vegetables; sulphite substitute for peeled potatoes; and detection of sulphite in foods. BSN

- 2253 BELITZ (H-D) and WIEGER (H). Bitter compounds: Occurrence and structure-activity relationships. Review. *Food Rev. Int.* 1(2); 1985; 271-354

- 2254 SCHUSTER (B) and HERRMANN (K). Formation of hydroxybenzoic acids from flavonoids by enzymatic and alkaline hydrolyses. *Z. Lebensmittel. Unters. Forsch.* 181(6); 1985; 467-9 (German)

- 2255 WHITEFIELD (FB), SHAW (KJ) and LYNGUYEN (TH). Simultaneous determination of 2,4,6-trichloroanisole, 2,3,4,6-tetrachloroanisole and pentachloroanisole in foods and packaging materials by high-resolution gas chromatography - multiple ion monitoring-mass spectrometry. *J. Sci. Food Agric.* 37(1); 1986; 85-96

A method has been developed for the determination of 2,4,6-trichloroanisole, 2,3,4,6-tetrachloroanisole and pentachloroanisole in foods and packaging materials using combined high resolution gas chromatography - multiple ion monitoring - mass spectrometry, and with the addition of 3,5-dimethyl-2,4,6-trichloroanisole as an internal standard, a series of calibration curves were prepared covering the concentration range 1 to 100 µg/kg. The detection limit, with quantitation by extrapolation only, was 0.01 µg/kg. The mean extraction efficiency of the combined distillation extraction step was greater than 90% for each of the chloroanisoles analysed. KAR

- 2256 GUSTAFSSON (J-G), PREJ (A-K) and HEDMAN (P). Monitoring of protein product formation during fermentation with fast protein liquid chromatography. *Biotechnol. Bioeng.* 28(1); 1986; 16-20

- 2257 JOE (FL) Jr., SALEMME (J) and FAZIO (T). Liquid chromatographic determination of basic nitrogen-containing polynuclear aromatic hydrocarbons in smoked foods. *J. Assoc. Off. Anal. Chem.* 69(2); 1986; 218-22

Several smoked foods were analyzed for basic nitrogen containing polynuclear aromatic hydrocarbons (NPAH) content by a rapid liquid chromatography (LC) technique. The procedure consisted of extraction of NPAH from samples (both domestic and imported) with basic aqueous ethanolic solution into cyclohexane, extraction with cyclohexane with 6 N HCl, and extracted back into cyclohexane after neutralization of the acid NPAH purified on filtration through deactivated basic alumina and the eluate concentrated to dryness and residue dissolved in 95% ethanol and then analyzed by LC using a Vydac C-18 column and acetonitrile-water (9+1) as mobile phase. 5-7 dimethylbenz(ah)acridine, dibenz(af) acridine and diabenzo(a,h) acridine, each added to salmon and sausage at the 5 ppb level, showed recoveries of 62 - 101% by

fluorescence measurement and from 64-106% by UV measurement. BSN

- 2258 GRAMSHAW (JW). An introduction to the theory and practice of high performance liquid chromatography. IFST Proc. 18(1); 1985; 31-42
- 2259 REYNOLDS (SL). The use of HPLC in the determination of fat-soluble vitamins in a variety of milk-based food products. IFST Proc. 18(1); 1985; 43-50

FOOD LAWS AND REGULATIONS

Nil

FOOD MICROBIOLOGY

Ethanol

- 2260 JONES (RP) and GREENFIELD (PF). Role of water activity in ethanol fermentations. Biotechnol. Bioeng. 28(1); 1986; 29-40
- 2261 DUMOULIN (ED), DURATE-COELHO (AC), COGAT (PO) and GUERAIN (JT). Determination of ethanol in complex products of distilleries by stripping and gas chromatographic analysis. J. Agric. Food Chem. 34(1); 1986; 66-70

This paper describes a method of volatile ethanol determination in complex products of distilleries, suitable for automated on-line analysis. Basically an inert gas bubbles through the alcoholic liquid phase and strips a small quantity of ethanol. The vapour phase is subsequently analyzed by gas chromatography with a flame ionization detector. We show that the analysis of the vapour phase permits a fast and reproducible determination of ethanol concentrations in the liquid phase ranging from 0.01 to 10% v/v. Periodic monitoring with standard test solutions is necessary. AA

Mushrooms

- 2262 MARTIN (AM). A review of fundamental process aspects for the production of mushroom mycelium. J. Food Process Eng., 8(2); 1986; 81-96
Discusses: type of mushroom; culture medium; and processing methods. BSN
- 2263 KAZANAS (N). Pathogenicity of a fungus resembling *Wangiella dermatitidis* isolated from edible mushrooms. Appl. Environ. Microbiol. 51(2); 1986; 261-7

FOOD ADDITIVES

- 2264 WONNACOTT (JE) and JUKES (DJ). Chemical additives in food. A review of the regulatory processes governing their control and the procedures for evaluating their safety in use. Food Chem. 19(1); 1986; 11-48
Aspects covered in the review are legislative background, official safety evaluation programmes, objections to safety evaluation programmes, developments in toxicity testing, specific sensitivities, and risk/benefit analysis. KAR

Caramel

- 2265 SCHEUTWINKEL-REICH (M) and HUDE (W Von der). On the in-vitro mutagenicity of caramel colours. *Z. Lebensmittel Unters. Forsch.* 181(6); 1985; 455-7 (German)

Stabilizers

- 2266 TROUT (GR) and SCHMIDT (GR). Effect of chain length and concentration on the degree of dissociation of phosphates used in food products. *J. Agric. Food Chem.* 34(1); 1986; 41-5

A sodium ion selective electrode was used to determine the degree of dissociation of six different sodium phosphates commonly used in food products. The phosphates investigated had number average chain lengths between 1.0 and 20.8. All phosphates were analyzed at pH 6.0 and at four concentrations between 0.15 and 0.60%. The results showed that the concentration had no significant ($P > 0.05$) effect on the degree of dissociation of the phosphates, whereas the chain length had a large significant effect ($P < 0.001$). The degree of dissociation decreased as the chain length of the phosphate increased; the rate of decrease was proportional to the square of the chain length. The values for the degree of dissociation ranged from 91.6% for the shortest chain length phosphate to 38.0% for the longest. AA

Monosodium glutamates

- 2267 GHEZZI (P), BIANCHI (M), GIANERA (L), SALMONA (M) and GARATTINI (S). Kinetics of monosodium glutamate in human volunteers under different experimental conditions. *Food Chem. Toxicol.* 23(11): 1985; 975-8

CEREALS

- 2268 ELLIS (R) and MORRIS (ER). Appropriate resin selection for rapid phytate analysis by ion-exchange chromatography. *Cereal Chem.* 63(1); 1986; 58-9

For phytate analysis, AG1-X8 A(100-200 mesh) anion exchange resin was not found appropriate, because it does not elute phytate quantitatively. Large variations in different lots of AG1-X8 (100-200 mesh) resins were also observed. AG1-X4 (100-200 mesh) appeared to be the best resin for both accuracy and rapidity. BSN

Barley

- 2269 BHATTY (RS). Physicochemical and functional (bread making) properties of hullless barley fractions. *Cereal Chem.* 63(1); 1986; 31-5

The study has revealed that based on mixogram data, 5% or possibly 10% barley flour could be added in place of wheat flour in preparation of bread without seriously affecting appearance and loaf volume. BSN

Buckwheat

- 2270 TAIRA (H), AKIMOTO (I) and MIYAHARA (T). Effects of seeding time on lipid content and fatty acid composition of buckwheat grains. *J. Agric. Food Chem.* 34(1); 1986; 14-7

Rice

- 2271 JULIANO (BO). Rice properties and processing. *Food Rev. Int.* 1(3); 1985-86; 423-45

Discusses: morphology of rice; postharvest technology; milling and milling fractions; aging and parboiling; market quality; cooking and eating qualities; nutritional value; processed rice products (parboiled rice, precooked, quick-cooking and convenience rice foods, canned rice, infant foods, convenience rice food, expanded rice products, dry breakfast cereals and snack foods; extrusion cooked products), rice dishes and puddings; rice breads; rice cakes; rice flours and starch; rice noodles; fermented rice foods; rice wines and beer adjunct. BSN

- 2272 SAUNDERS (RM). Rice bran: Composition and potential food uses. *Food Rev. Int.* 1(3); 1985-86; 465-95

Discusses: composition of a rice kernel, production and composition of rice bran; protein; carbohydrates; lipids; vitamins and minerals; rice bran fractionation (dry and wet fractionation); organic solvent fractionation; rice bran stabilization; stabilization process (retained moisture heating added moisture heating and dry heat methods); recovery of edible oil; nutritive value of rice bran; antinutritive factors; dietary fibre; food uses; and rice germ. BSN

- 2273 GUO (VJ), BISHOP (R), FERHNSTROM (H), YU (GZ), LIAN (YN) and HUANG (SD). Classification of Chinese rice varieties by electrofocussing. *Cereal Chem.* 63(1); 1986; 1-3

By electrofocussing examination of prolamin, 25 varieties of Chinese rice, were grouped into four major groups, while two bands (pI 5.3 and 7.7) are constitutive, four major protein bands allow differentiation of Indica, Japonica, and glutinous rices and their hybrids. Minor bands indicated further differentiation within each subgroup. BSN

- 2274 WEBB (BD), POMERANZ (Y), AFEWORK (S), LAI (FS) and BOLLIICH (CN). Rice grain hardness and its relationship to some milling, cooking and processing characteristics. *Cereal Chem.* 63(1); 1986; 27-30

Five methods ((a) time to grind (BMHT), (b) particle size index (PSI), (c) near infrared reflectance (NIR), (d) resistance to grinding (RES) and (e) crushing force (KIYA) were employed for determining hardness of (i) milled, (ii) brown and (iii) rough rice forms of 28 long, medium and short grain rice varieties varying widely in milling, cooking and processing characteristics. A relative wide range in values among one or more of (i), (ii) and (iii) were observed. (a), (c) and (e) differentiated between (i), (ii) and (iii), whereas (b) and (d) distinguished only one form of rice. Correlations among hardness indices and three rice forms and among rice forms for each hardness were significant, but were of a low order of magnitude. Some associations, either generally low or insignificant were indicated by correlations between hardness and rice grain quality parameters (milling yield, amylose, alkali spreading value, gelatinization temperature, protein and grain size and shape. BSN

- 2275 ENGELS (C), HENDRICKX (M), De SAMBLANX (S), De GRYZE (I) and TOBBACK (P). Modelling water diffusion during long-grain rice soaking. *J. Food Eng.* 5(1); 1986; 55-73

Three different mathematical equations were obtained by solving the diffusion equation of Fick analytically for an infinite cylinder with three different boundary conditions: (i) immediate surface saturation; (ii) surface resistance; (iii) two layers with different diffusion properties. The soaking of long-grain white rice (La Belle) can best be approximated by a method where an immediate surface saturation is assumed, while the two-layer model gives the best approximation in simulating the moisture uptake of brown rice. The activation energies of the diffusivity through the endosperm and the testa were calculated, assuming an Arrhenius type equation for diffu-

sion dependence on temperature, to be 22.5 kJ mol^{-1} and 64.5 kJ mol^{-1} .
AA

- 2276 CHINNASWAMY (R) and BHATTACHARYA (KR). Pressure - parboiled rice: A new base for making expanded rice. *J. Food Sci. Technol. (India)* 23(1); 1986; 14-9

Intan variety of paddy with 11, 17, 20 and 22% moisture content was steamed under pressure ranging from 0.5 to 3.0 kg/cm^2 for 5-30 minutes. To overcome the brown colour of parboiled rice, paddy was treated with sodium bisulphite in 0.1-10% concentration for 1-2 minutes and drained and steamed immediately or after 30 hours. Expanded rice prepared from (i) pressure parboiled rice was compared with those prepared by (ii) normal parboiled rice (paddy fully soaked, then steamed) or (iii) dry-heat parboiled rice (paddy fully soaked, then roasted with sand). Best expansion was given by pressure parboiled rice produced by lowest grain moisture (11%) and high pressure steaming (11% moisture with 3 kg/cm^2 pressure for 10-20 minutes or 17% moisture with $2.56-3 \text{ kg/cm}^2$ pressure for 10-15 minutes). This expansion ratio is superior to those obtained by (ii) or (iii). The high discolouration of the pressure parboiled rice could be estimated using 2% sodium bisulphite solution instead of using water for washing paddy before steaming. The expansion ratio was more (10-10.5) in pressure parboiled rice when it was sprinkled with common salt compared to 8-8.5 in the normal commercial methods of manufacture. KAR

- 2277 KULKARNI (SD) and BAL (S). Studies on effect of evacuation of paddy on quality characteristics of parboiled rice. *J. Food Sci. Technol. (India)*. 23(1); 1986; 33-6

Intergranular air from paddy was removed and soaked in water at room temperatures 30, 40, 50, 60, 70 and 80 C for 15, 30, 45 minutes and 1, 2, 3, 4, 5, and 6 hours. The soaked paddy was shade dried to 14% moisture and milled. The quality of rice obtained was evaluated and compared with the rice obtained from non-evacuated samples soaked at the same temperature and duration. When paddy was milled as raw head rice yield was 60.8%, evacuation gave still lower head yields. Paddy soaked in $> 60 \text{ C}$ gave considerable increase in head yield and it was more with evacuated paddy. Rice obtained from evacuated samples was less hard than the non-evacuated rice. Vacuum applied paddy gave rice with less colour (Yellowness index) than the rice from normal soaked paddy; the difference was more at higher temperature and longer soaking period. The % chalky kernels in rice subjected to vacuum was less than in ordinary soaking. It is light coloured parboiled rice with higher head yield and reduced soaking time (by 1.5 hour) could be obtained by subjecting paddy to vacuum prior to soaking. KAR

- 2278 BILIADERIS (CG), PAGE (CM), MAURICE (TJ) and JULIANO (BO). Thermal characterization of rice starches: A polymeric approach to phase transitions of granular starch. *J. Agric. Food Chem.* 34(1); 1986; 6-14

The thermal properties of eight purified rice starches varying in physicochemical characteristics were investigated by differential scanning calorimetry (DSC) and thermomechanical analysis (TMA). There were significant correlations between DSC transition temperatures and gelatinization temperatures obtained by photometry, transition enthalpies and gelatinization temperatures, and volume expansion at 90 or 95 C and amylose content. Although the Flory-Huggins theory for polymer melting fits the experimental data, it is not applicable to starch/water systems because of their irreversible (nonequilibrium) melting behaviour. Water acts as a plasticizer (at $\approx 30\%$ water content) of the amorphous parts of the granule and thus depresses their glass transition temperature (T_g). This induces crystallite melting to commence at lower temperatures. Both annealing and recrystallization take place during heating in the DSC, particularly at

intermediate to low water contents. A three-phase model incorporating two distinct types of amorphous material and the crystalline domains of the amylopectin short-chain clusters is proposed to account for the thermal properties of granular starch/water mixtures. The TMA volume expansion curves of all nonwaxy (17-33% amylose) samples exhibited a two-stage swelling behaviour. The first is associated with the onset of gelatinization phenomena (glass transition and partial melting) while the second coincides with the melting of starch crystallites. AA

- 2279 TSUGITA (T). Aroma of cooked rice. *Food Rev. Int.* 1(3); 1986; 497-520

Discusses: volatile components of cooked and scouted rice; changes in cooked aroma of stored rice; effect of parboiling on aroma of cooked rice; volatile components of rice bran; volatile components of unprocessed rice; and volatile components of wild rice. BSN

- 2280 BUTTERY (RG), LING (LC) and MON (TR). Quantitative analysis of 2-Acetyl-1-pyrroline in rice. *J. Agric. Food Chem.* 34(1); 1986; 112-4

A relatively simple practical method has been developed for the quantitative analysis of 2-acetyl-1-pyrroline in rice samples. The rice analysis method uses a steam distillation continuous-extraction isolation procedure with an acid-phase solvent extraction. This is followed by regeneration of the basic volatiles and capillary or packed column gas chromatography analysis. Testing of the method, with a bland rice variety containing known added concentrations of 2-acetyl-1-pyrroline, showed that the method was sufficiently accurate for the purpose. AA

Wheat

- 2281 BATTEN (GD) and LOTT (JNA). The influence of phosphorus nutrition on the appearance and composition of globoid crystals in wheat aleurone cells. *Cereal Chem.* 63(1); 1986; 14-7

- 2282 FINNEY (PL) and ANDREWS (L). A 30-minute conditioning method for micro-, intermediate-, large-scale experimental milling of soft red winter wheat. *Cereal Chem.* 63(1); 1986; 18-21

Wheat was conditioned for 30 minutes after a pretemper for 15 minutes, a prebreak and a final temper for 15 minutes and an optional second prebreak. For milling 200 g of soft red winter wheat on two quadrumat juniors or 1.5 kg on an Allis-Chalmers mill or 10 kg on a Miag Multomat mill, the method was highly successful. Flour moisture, yield, ash, damaged starch and cookie quality were comparable in both 18-24 hours and 30 minutes temperature samples subjected to employed prebreak methods. BSN

- 2283 ZAYAS (I), LAI (FS) and POMERANZ (Y). Discrimination between wheat classes and varieties by image analysis. *Cereal Chem.* 63(1); 1986; 52-6

Image analysis was used on-line to discriminate variables of grain morphology to differentiate among individual kernels of four hard red winter (HRW) and four soft red winter wheat cultivars, and between two HRW and two hard red spring wheat cultivars. Individual kernels and sets of kernels were differentiated using software developed in our laboratories. The main objective was to differentiate rapidly, using a minimum of critical and simple parameters. Differentiation was based on the development of canonical equations for comparing kernels on the basis of six parameters; width; length ratio, tangent, sine, and length of arc of parabolic segment. The program was verified by SAS multivariate discriminant analysis using the same variables extracted directly from the image of a kernel. The method was also used for discrimination of mixtures of wheat varieties from the

three classes. For mixtures of three varieties of either HRW or of soft red winter wheat, the average percentage of correctly classified kernels were 85% for training set and 83% for experimental set samples. For mixtures of two varieties of either HRW or of hard red spring wheat, the average percentages were 78% for calibration samples and 77% for test samples. AA

- 284 WILLIAMS (PC). The influence of chromosome number and species on wheat hardness. *Cereal Chem.* 63(1); 1986; 56-7

By using an established grinding/sieving method, and the particle size index test, cereals of different species, varieties and genotypes of diploid, tetraploid or hexaploid genetic constitution were tested for their hardness rating. Diploid types were all very soft with tetraploid wheats being very hard. A combination of AAAB and DD genome in hexaploid wheats led to a complete spectrum of hardness from very hard to very soft. Hexaploid triticales showed a similar range of hardness while the diploid secale (rye) lines were similar to diploid wheats. BSN

- 285 RANGASWAMY (JR) and SASIKALA (VB). Kinetics of phosphine residue dissipation from wheat and its milled products in storage. *J. Food Sci. Technol. (India)* 23(1); 1986; 54-8

A detailed and comparative study of the kinetics of the phosphine (PH_3) residue in two wheat types, hard brown Punjab wheat and soft white wheat and the milled products of wheat (whole wheat flour, white flour, and semolina) has been made for the first time. Using the linear relationship between log of computed PH_3 residues and days in storage, coefficient of desorption of PH_3 for each of the commodities has been calculated. The change in the magnitude of initial PH_3 residue has been followed over 7 days of airing period. Hard brown Punjab wheat holds the highest, and semolina the least amount of initial residue, and dissipation of this residue is slowest in whole wheat flour and fastest in semolina. Due to stratification of desorbed PH_3 , waxing and waning in the desorbed amount of PH_3 occurred. This study has provided an answer not only to the problem of prolonged desorption of PH_3 which was not understood till now, but also evidences for the presence of bound residues of PH_3 in fumigated commodities. KAR

- 286 RICHARDSON (SJ), BAIANU (IC) and STEINBERG (MP). Mobility of water in wheat flour suspensions as studied by proton and oxygen-17 nuclear magnetic resonance. *J. Agric. Food Chem.* 34(1); 1986; 17-23

The mobility of water in wheat flour suspensions and doughs (30-95% moisture) was investigated by nuclear magnetic resonance (NMR), in water and deuterium oxide. Two frequencies (20, 360 MHz) and two pulse sequences were employed for the proton (^1H) data; the standard 34 MHz and single pulse were used for the oxygen-17 (^{17}O) NMR data. The standard isotropic two-state model with fast exchange was used to interpret these data by means of the Derbyshire and Kumosinski models. The correlation time for the water "bound" by wheat flour was calculated to be 16.7 ps. The results suggested that the best NMR methodology for the investigation of water mobility in wheat flour suspensions was provided by ^{17}O NMR in deuterium oxide. However, both ^{17}O and ^1H NMR results showed the same trend in the dependence of the transverse relaxation rate of flour concentration in both water and deuterium oxide. AA

- 287 WU (Y), SEIB (PA) and HOSENEY (RC). Low protein flour from hard winter wheat: Wet processing to improve breadmaking potential. *Cereal Chem.* 63(1); 1986; 43-7

A method to make white pan bread from low-protein wheat flour was tested for technical feasibility. Starting with two hard winter wheat flours, 20% of the flour in a formula was processed wet

(water/flour = 2.25) into protein-rich fraction and a starch fraction. The wet, protein-rich fraction was combined with flour to make p
loaves, and the wet starch fraction was used with soft wheat flour
prepare cakes, muffins, and cookies. Wet processing of 20 g of flour
(9.3% protein) and flour B (12.2% protein) gave 31.5 g and 36.1
respectively, of the wet, protein-rich fraction, which contained 5.5
and 8.1 g dry solids with 28.1% and 27.2% protein (d.b.) respectively.
When this fraction was incorporated with the remaining flour in
dough, the "new" flour in the dough increased about 1% in protein (14
m.b.). After baking, the bread showed approximately 86% of the
increase in loaf volume expected for the 1% increase in flour protein.
The wet starch fraction from 40 g of flour A (containing 22.4 g dr
solids with 2.8% protein, d.b.) was added to an egg-foam cake in plac
of about one-fourth of the cake flour. The starch improved cake volum
by 5%. Replacing one-fourth of formula flour in muffins and soft cook
ies had little or no effect on their appearance or softness. AA

- 2288 MEIER (P), WINDEMANN (H) and BAUMGARTNER (E). Analysis of whole
gliadin from untreated and heat-treated wheat flours by reversed-phase
high-performance liquid chromatography. *Z. Lebensmittel Unter
Forsch.* 180(6); 1985; 467-73 (German)

- 2289 LEELAVATHI (K), HARIDAS RAO (P) and SHURPALEKAR (SR). Studies on the
functional characteristics of differently milled whole wheat flour
(atta). *J. Food Sci. Technol. (India)* 23(11); 1986; 10-14

The chemical composition and dough forming characteristics and
chapati making quality of whole wheat flour (atta) milled in (i)
stone, (ii) disc (chakki), (iii) hammer, (iv) pin and (v) roller mills
have been studied. Atta samples milled in disc, stone and pin mills
had significantly higher diastatic activity (365-505 mg/10 g flour)
and damaged starch (12.0-18.8%) content as compared to hammer and
roller milled flours. The water requirement of a chapati dough varied
from 68 to 82%. Among the differently milled atta samples, consider-
able variations were observed in dough development time (3.0-5.5
minutes) dough stability (2.0-4.5 minutes) as indicated by the farin-
ograms and resistance to extension (410-590 BU) and extensibility
(50-65 mm) as indicated by the extensograms. The chapati made from
stone milled atta was superior with soft texture and better flavour,
while those made from hammer milled or roller milled atta were infe-
rior with somewhat hard texture and bland flavour. KAR

- 2290 NANAIHAH (MI), RAI (PV) and RAJAGOPAL (BS). Aflatoxin production in
wheat flour and its effect on protein and carbohydrate content of the
flour. *J. Food Sci. Technol. (India)* 23(1); 1986; 20-24

Wheat flour collected from eight locations of Bangalore city
(India) contained 0-660 µg/kg of aflatoxin B₁ and G₁. None of the
samples contained aflatoxin B₂ and G₂. Autoclaved wheat flour was
adjusted to 15, 20, 25 and 30% moisture, inoculated with *Asp. flavus*
and incubated at 24 ± 2°C and in another experiment wheat flour with
20, 25 and 30% moisture level was incubated at 10, 20 and 30°C after
inoculating with *Asp. flavus*. A combination of 30% moisture and
incubation temperature of 30°C favoured maximum aflatoxin production.
The concentration of alkali soluble and water soluble protein decreas-
ed considerably but the acid soluble protein increased with incubation
period in the wheat flour inoculated with *Asp. flavus*. The alcohol
soluble protein showed initial increase up to 9 days followed by a
decrease during later stages of incubation. Reducing and non-reducing
sugars rapidly decreased upto 9 days followed by a gradual decrease.
Starch content decreased gradually with a uniform rate throughout the
incubation period. KAR

- 2291 RANGA RAO (GCP), HARIDAS RAO (P), LEELAVATHI (K) and SHURPALEKAR (SR). Effect of heat developed during grinding wheat in a disc mill in some chemical, rheological and chapati making characteristics of flour. *J. Food Sci. Technol. (India)* 23(1); 1986; 29-32

The temperature of the whole wheat flour (atta) when it came out of disc mill was 92 C which was lowered to 72 C during collection. The atta kept in open tray reached the room temperature of 30 C within an hour, while in closed tin it took about 9 hours to come to room temperature. Moisture content in the atta decreased from 10.1 to 6.8%; free-lipids increased and bound lipids decreased; total protein remained constant but their amount in different fractions varied considerably. Salt soluble proteins and gliadin increased by 0.3% and glutenin fractions decreased from 4.9 to 4.2% due to the effect of generated heat. Diastatic activity in control sample (minimum heat developed) was 196 mg/10 g flour, whereas in flour milled in disc mill, it was 373 mg/10 g flour. Lipase activity was quite stable to heat produced during grinding, but proteolytic activity decreased by 10%. The standard plate count decreased from 15,300 to 3,900/g due to grinding of wheat in disc mill. Very little difference was observed in farinograph and extensograph characteristics of flours due to grinding in disc mill; the water absorption increased from 65 to 76% due to grinding of wheat in disc mill. Flour from disc mill gave chapatis with more puffed height (7.1 cm compared to 6.0 cm for control), was pliable, had desirable light brown colour, soft and possessed sweetish taste and wholesome flavour. The rate of cooling of hot atta had no effect on any one of the above characteristics. KAR

MILLETS

Maize

- 2292 SAXENA (AK), TEOTIA (MS) and BEERH (OP). Food uses of maize: Preparation, packaging and storage of deep-fat fried salted boondi. *Indian Food Packer*. 40(1); 1986; 53-8

Boondi (a deep fat fried snack food product) is normally prepared from Bengal gram flour (besan). Replacement of besan upto 30% with maize flour did not adversely affect the organoleptic (texture, colour and overall acceptability) quality of the product when packed in friction top cans and stored upto 90 days at ambient temperatures (20±5 C) as against 75 days for control samples. Addition of 130 ml water, 2 g salt and 0.1 g sodium bicarbonate per 100 g besan gave the optimum desired quality characteristics when prepared from besan alone or from the composite mix of besan and maize flour. Equilibrium relative humidity studies indicated that the samples remained acceptable upto 60% RH. BSN

- 2293 POMERANZ (Y), CZUCHAJOWSKA (Z) and LAI (FS). Gross composition of coarse and fine fractions of small corn samples ground on the Stenvert hardness tester. *Cereal Chem.* 63(1); 1986; 22-6

The study has shown that Stenvert hardness tester has the potential for predictive determination of yields of products and their gross composition in dry milled corn. BSN

- 2294 POMERANZ (Y), CZUCHAJOWSKA (Z) and LAI (FS). Comparison of methods for determination of hardness and breakage susceptibility of commercially dried corn. *Cereal Chem.* 63(1); 1986; 39-43

Hardness of eight samples of corn dried under commercial conditions and equilibrated to 12.2-12.4 and 16.1-16.5% moisture was measured by density, Stenvert hardness tester, (SHT), near-infrared at 1680 nm and ratio of coarse to fine in the SHT

ground corn. By using stein tester (with a shear grinding action), the centrifugal impact Wisconsin tester (WBT), and the U.S. Grain Marketing Research Laboratory (USGMRL) corn-on-corn tester, the breakage susceptibility was measured. With higher moisture, density decreased, NIR increased, and the time to grind on SHT increased. Breakage susceptibility was much higher for the corn at 12% than for the 16% moisture corn. In the WBT, the susceptibility to breakage at either moisture level was about six times higher than in the USGMRL tester. Correlation coefficients among the between hardness and breakage susceptibility parameters were much higher for the 12% than for the 16% moisture corn. BSN

- 2295 WU (YV) and STRINGFELLOW (AC). Simple dry fractionation of corn distillers' dried grains and corn distillers' dried grains with solubles. *Cereal Chem.* 63(1); 1986; 60-61

- 2296 GUPTA (HO), CHATTERJEE (SR) and JOGINDER SINGH. Effect of popping and boiling on protein quality of maize (*Zea mays* L.) kernels. *J. Food Sci. Technol. (India)* 23(1); 1986; 59-60

Four maize var. (Shakti, Vijay, TV Time and Hawaiian Sugar) with 11% moisture content were popped at 230 ± 5 C and cooked in boiling water for 40-45 minutes separately. Dye binding capacity and lysine content were slightly increased by boiling and decreased by popping. In vitro protein digestibility improved in TV Time and Hawaiian Sugar Variety after popping and boiling respectively, but it decreased in Shakti and Vijay after these treatments. KAR

Ragi

- 2297 SNEHALATHA REDDY (N). Effect of varying periods of germination on the bioavailability of iron from ragi (*Eleusine coracana*). *Nutr. Rep. Int.* 31(3); 1985; 567-71

Sorghum

- 2298 HAHN (DH) and ROONEY (LW). Effect of genotype on tannins and phenols of sorghum. *Cereal Chem.* 63(1); 1986; 4-8

- 2299 POMERANZ (Y). Comparison of screening methods for indirect determination of sorghum hardness. *Cereal Chem.* 63(1); 1986; 36-8

Four indirect methods (i) time to grind by Brabender microhardness tester, (ii) resistance to grinding by the Stenvert hardness tester (SHT), (iii) particle size index (PSI), (iv) near-infrared reflectance (NIR) at 1680 nm, were applied to assess hardness of sorghum grain samples (65) from Nebraska (two years), Indiana, and Texas. (ii) was found useful for rapid and reliable differentiation among the samples, while (iv) was useful for testing samples, when an appropriate mill was available. Results of (iv) and (ii) were highly positively correlated, whereas Brabender microhardness tester and (iv) and (iii) were negatively correlated. BSN

- 2300 CHANDRASHEKAR (A) and DESIKACHAR (HSR). Sorghum quality studies. II. Suitability for making dumpling (mudde). *J. Food Sci. Technol. (India)* 23(1); 1986; 7-10

19 varieties of sorghum (*Sorghum vulgare*) were tested for mudde (dumpling prepared from whole meal or partially refined sorghum flour). Based on the sensory evaluation and texture of mudde obtained, these varieties were classified into good, moderate and poor mudde types. The tachymeter values for stickiness were 194 ± 45 g for good, 226 ± 43 g for moderate and 253 ± 34 g for the bad mudde groups. The gelatinization temperature was higher (76.5 ± 1.6 C) and peak viscosity was lower (322 ± 143 Brabender units) for good mudde groups. The

Kiya hardness values for grains were highest (7.8 ± 2.0 kg/cm²) for the good mudde variety. The α -amylase activity was lower (0.38 ± 0.24 mg maltose) for the good mudde group than for moderate (0.43 ± 0.37 mg maltose) and poor (0.79 ± 0.03 mg maltose) mudde group. Mudde prepared from unpolished grains had lower stickiness, but the texture of mudde prepared from the polished grain was preferred by the panel. KAR

- 2301 REDDY (BN) and NUSRATH (M). Mycotoxin contamination in stored sorghum. *Sci. Cult.* 52(1); 1986; 31-2

Sorghum varieties (CVS, CSH-1, CSH-5, CSH-9, IS-14338 and Y-75) were stored for 6 months in village storage structures and analysed for mycotoxins and quantified by spectrometry. Among the varieties Y-75 had the highest (48%) contamination of mycotoxin followed by CSH-9 (27%), CSH-5 (24%) and CSH-1 (18%), IS-14338 had the lowest (15%) contamination. In majority of samples, aflatoxin levels were higher than those of other mycotoxin. Y-75 had highest (565 μ g/kg) aflatoxin B₁ while IS-14338 had lowest amount (15 μ g/kg) of zearalenone. Generally, all samples positive for aflatoxin G₂ were positive for all other detected mycotoxins. Of the 138 samples examined, aflatoxin B₁ was found in 25 samples followed by aflatoxin B₂ (17 samples), aflatoxin G₁ (16 samples) and aflatoxin G₂ (14 samples). Eight samples showed ochratoxin A and 7 showed T-2 toxin. Zearalenone and citrinin were detected in 4 samples each. MVG

PULSES

- 2302 EKPENYONG (TE). Effect of cooking on polyphenolic content of some Nigerian legumes and cereals. *Nutr. Rep. Int.* 31(3); 1985; 561-5

Cooking reduces significantly the tannin levels in jowar which is attributed to the destruction of polyphenolic compounds by moist heat. It is also due to the formation of some insoluble complex between the tannin and protein. It is concluded that for nutritional purposes, light coloured cultivars and cooking prior to eating would increase nutritional value. KAR

Lentils

- 2303 ABOU-SAMAHA (OR), EL-MAHDY (AR) and MOHARRAM (YG). Effect of soaking on the quality of lentil seeds. *Z. Lebensmittel Unters Forsch.* 180(6); 1985; 485-90

Moth beans

- 2304 FAWAR (VD), SAWATE (AR) and INGLE (UM). Changes in phytate phosphorus and minerals during germination and cooking of moth bean (*Phaseolus aconitifolius* Jacq) seeds. *J. Food Sci. Technol. (India)* 23(1); 1986; 36-9

Moth bean was germinated at 21 C for 120 hours and analysed for dry weight, ash, total P, phytate P, non phytate P, Ca, Mg, Fe and K at 24 hours intervals. The samples were autoclaved at 116 C for 5, 10, 15, 20, 25, 30, 35, 40 and 45 minutes at steam pressure of 10 psi. During germination for 120 hours the dry weight decreased by 87% and the ash content increased from 3.84 to 4.25%. The decrease in phytate P was gradual during the initial stages of germination with simultaneous liberation of inorganic P; at the same time, non-phytate P increased rapidly. No significant changes were observed in the concentration of Ca, Mg, Fe and K during germination. After cooking for 45 minutes with beans-to-water ratio of 1:4 whole seeds and cotyledons did not show any breakdown in the phytate P or losses of minerals after initial leaching. KAR

- 2305 GHORPADE (VM), CHAVAN (JK) and KADAM (SS). Studies on preservation of moth bean sprouts. **Indian Food Packer**. 40(1); 1986; 49-52

Moth bean (*Vigna aconitifolium* Jacq Marechal) sprouts were blanched in 10% NaCl solution for 3 minutes, followed by dehydration at 60°C for 8 hours. They could be reconstituted into an excellent product with desired characteristics and without significant loss of nutrients (protein, free amino acids, reducing sugars, starch, calcium and phosphorus). The storage of sprouts for 30 days at ambient temperatures caused only a slight decrease in starch, reducing sugars and P contents. BSN

Winged beans

- 2306 SRIKANTHA (S), HETTIARACHCHI (NS) and ERDMAN (JW) Jr. Nutrient, antinutrient contents and solubility profiles of nitrogen, phytic acid, and selected minerals in winged bean flour. **Cereal Chem.** 63(1); 1986; 9-13

Protein and oil contents in dehulled seed flour of 12 cultivars of Sri Lankan winged bean (*Psophocarpus tetragonolobus*) ranged from 37.4-46.3 and 20.9-26.5% on dry weight basis respectively. Phytic acid and trypsin inhibitor were present in the range 1.0-1.7% and 52.2-99.5 units/mg of flour respectively, whereas tannins in whole meal varied between 0.2-0.7 mg/catechin equivalent per gram of flour. At pH 2, nitrogen solubility decreased from 32% and then to 12% at pH 4.0. Conversely, phytic acid soluble at 25% at pH 2.0, rose to 48% at pH 4.0. However, at neutral pH, solubilities of nitrogen and phytic acid were 50 and 80% respectively. While phytic acid solubility showed a steep decrease to 5.5% at pH 12.0, nitrogen solubility remained high at 72%. With an increase in pH from 2.0 to 6.0 and above, solubility of Ca, P and Zn decreased. The results of the investigation indicate the possibility of preparation of a winged bean protein concentrate with low phytic acid content. BSN

OILSEEDS AND NUTS

Coconuts

- 2307 ATPUTHARAJAH (JD), SAMARAJEEWA (U) and VIDANAPATHIRANA (S). Efficiency of ethanol production by coconut toddy yeasts. **J. Food Sci. Technol. (India)** 23(1); 1985; 5-7

Yeasts fermenting coconut inflorescence sap (toddy) were isolated from the fermenting sap in the pot at 4, 7, 10, 13, 18, 28, 39, 54, 61, 79, 103 and 157 hours from the time introducing the sap into the pot. The samples were plated in Bacto-wort agar, Bactonutrient agar, Bacto-sabaud dextrose agar and 2% Bacto-agar in unfermented coconut sap. The pure cultures were isolated and purified by streak plate technique. A total of 144 yeast isolates were characterized. Based on the loss in weight of the sap and ethanol production, they were divided into 3 groups. The first group which comprised of 75 isolates produced a maximum of 9% ethanol and comprised of *Saccharomyces chevalieri*, *Pichia ohmeri*, *Schizosaccharomyces pombe* and *Kloeckera javanica*. Medium ethanol concentration of 4-6% were produced by 17 isolates and the remaining 52 isolates produced traces or no ethanol. It is concluded that the low ethanol concentration of 6-7% produced in normal toddy fermentation could be increased to 9% ethanol if the low and medium ethanol producing yeasts are suppressed. BSN

Groundnuts

- 2308 NARASIMHAM (NV), von OPPEN (M) and PARTHASARATHY RAO (P). Consumer preferences for groundnut quality. *Indian J. Agric. Econ.* 40(4); 1985; 524-35

An attempt has been made to explain market prices of groundnuts as a function of quality characteristics. This study, carried out at an assembling market in Andhra Pradesh (India), indicates that 60-65% of the variation in price can be explained by a set of six, relevant, quality characteristics viz., hundred seed weight, shelling %, oil content, % damaged seeds, % shrivelled seeds, and % scarified pods. The results might help breeders to choose an optimal mix of these quality characteristics. KMD

Mustard

- 2309 PALMIERI (S), LORI (R) and LEONI (O). Myrosinase from *Sinapis alba* L: A new method of purification for glucosinolate analyses. *J. Agric. Food Chem.* 34(1); 1986; 138-40

Myrosinase from white mustard seeds (*Sinapis alba*) has been purified starting from aqueous crude extract in a single step by affinity chromatography on Con A-Sepharose. The specific activity, recovery, and binding capacity in four separate trials using glucose, mannose, methyl α -D-glucoside, and methyl α -D-mannoside for elution were also determined. The enzyme isolated by our approach showed a good degree of purification, appearing homogeneous on SDS-PAGE analyses. In the four trials of purification, the specific activity and recovery ranged from ca. 21 800 to 26 000 U/mg and 39.2 to 91.1%, respectively. The binding capacity of Con A-Sepharose for myrosinase was 6.6 mg/mL gel bed, which corresponds to 150 000 U/mL of chromatographic bed. In addition, the enzyme bound in a column to Con A-Sepharose remained active towards substrates. In this condition, myrosinase can therefore be useful for routine analyses of total glucosinolates. AA

Rapeseeds

- 2310 BUSCH (H). Performance of winter rapeseed varieties with double quality. *Fette Seifen Anstrichm.* 87(7); 1985; 257-61 (German)
- 2311 ENTRUP (EL). First cultivation experiences with winter rapeseed with double quality. *Fette Seifen Anstrichm.* 87(7); 1985; 265-7 (German)
- 2312 DENECKE (P). Experience in processing of quality rapeseed for one year. *Lebensmittelindustrie.* 32(2); 1985; 67-8

TUBERS AND VEGETABLES

- 2313 SPEEK (AJ), TEMALILWA (CR) and SCHRIJVER (J). Determination of β -carotene content and vitamin A activity of vegetables by high-performance liquid chromatography and spectrophotometry. *Food Chem.* 19(1); 1986; 65-74

In this fast and sensitive HPLC, after alkaline saponification and organic extraction, β -carotene is separated from other carotenoids on a reversed phase HPLC column and determined by measuring its absorbance at 445 nm. KAR

Onions

- 2314 SIDHU (AS) and CHADHA (ML). Studies on the storage life of Kharif onion. *Indian Food Packer*. 40(1); 1986; 69-72

Effect of maleic hydrazide (MH), 2000 and 4000 p.p.m., cycocel 1000 and 2000 p.p.m. and isopropyl N-(3-chlorophenyl)-carbamate (CIPC) 2000 p.p.m. (bulbs treated with tops) and without tops separately on the onions harvested from the kharif crop of 1983-84 and 1984-85 was studied. None of the chemicals were effective in checking sprouting of onions, although MH at both the concentrations gave better results than others. The study has indicated the need for selecting bulb with close neck to depress sprouting during storage. BSN

Apios priceana

- 2315 WALTER (WM), CROOM (EM) Jr., CATIGNANI (GL) and THRESHER (WC). Compositional study of *Apios priceana* tubers. *J. Agric. Food Chem.* 34(1); 1986; 39-41

Carrots

- 2316 HOJILLA (MP), GARCIA (VV) and RAYMUNDO (LC). Thermal degradation of β -carotene in carrot juice. *Asian Food J.* 1(4); 1985; 157-61

β -carotene degradation in carrot juice heated from 104 to 132 C was quantitatively defined by determining the D-values, Arrhenius rate constants (k), Z-value and activation energy (E_a). The destruction of β -carotene was confirmed to follow first-order reaction kinetics. The D-values (min^{-1}) were 394, 108, 79, 41, 21, and 17 for 104, 110, 115, 121, 127 and 132 C, respectively. Corresponding rate constants (min^{-1}) were 5.84×10^{-3} , 2.13×10^{-2} , 4.70×10^{-2} , 1.11×10^{-1} and 1.34×10^{-1} . The Z-value of 25.5 C and E_a of 25.6 KCal/mole indicated the thermal stability of provitamin A during processing. The apparent increase in β -carotene content observed during the early stage of heating at 104 and 110 C was postulated to result from possible reversion of cis-isomers to trans-forms or from the leaching of water-soluble constituents which increased the relative concentration of water-insoluble components like β -carotene. AA

Cassava

- 2317 RAJA (KCM) and MATHEW (AG). Effect of parboiling on hydration and sedimentation characteristics of cassava (*Manihot esculenta* Crantz) chips. *J. Food Sci. Technol. (India)* 23(1); 1986; 39-41

Cassava (var. Malayan-4) chips (4.0-5.0 mm thickness) were (i) dried in cross flow dryer at 58 ± 2 C for 1 hour to 10% moisture level and (ii) dipped in boiling water (parboiling) for 5 and 10 minutes and dried for 8 hours to 8% moisture level. Hydration behaviour of (i) and (ii) chips was studied at room temperature (28-30 C), 60, 80, 92 and 96 C for 15 minutes soaking and cooking at 96-98 C after soaking for 5, 10, 15 and 20 minutes. At room temperature (ii) showed higher water absorption. The equilibrium moisture content attained by soaking for 8 hours was higher in (ii). Water absorption was higher in those parboiled by soaking in boiling water for 10 minutes. Correlation was observed between hydration of chips and temperature of soaking; (i) absorbed 70% of their final water uptake, whereas (ii) showed a lower % of water absorption (54.32 - 61.50%). Flour from (ii) showed a higher sediment volume than the flour from (i). A positive correlation between equilibrium moisture content and sediment volume was observed at room temperature. KAR

- 2318 RICKARD (JE). Tannin levels in cassava, a comparison of methods for analysis. *J. Sci. Food Agric.* 37(1); 1986; 37-42

A direct vanillin method for estimation of tannin levels in cassava was compared with other standard methods based on extraction

procedures. The specificity of the methods is discussed in relation to the levels of tannins detected and their potential biological activity in freeze dried fresh and dried/processed cassava samples. KAR

Buffalo gourds

- 319 SCHEERENS (JC) and BERRY (JW). Buffalo gourd: Composition and functionality of potential food ingredients. *Cereal Food World*. 31(2); 1986; 183-4, 186-8, 190-92

Aspects covering botany; domestication history; composition; potential uses; oil quality; protein quality; starch; and commercial potential of buffalo gourd (*Cucurbita foetidissima*) have been covered in this article. KAR

Tomatoes

- 320 PREMACHANDRA (BR). Genetic regulation of carotene biosynthesis in selected tomato strains: Aspects of β -carotene biosynthesis and B-gene specificity. *Int. J. Vit. Nutr. Res.* 56(1); 1986; 35-43

- 321 CRONIN (DA) and HOULIHAN (EK). Chemical, physical and organoleptic properties of tomatoes grown in peat and nutrient film under controlled conditions. *Ir. J. Food Sci. Technol.* 9(1); 1985; 53-8

- 322 GROSS (KC). Composition of ethanol-insoluble polysaccharides in water extracts of ripening tomatoes. *Phytochemistry*. 25(2); 1986; 373-6

- 323 MUDAHAR (GS), BHUMBLA (VK), MINHAS (KS) and SIDHU (JS). Thermal processing of whole tomatoes under low pH conditions. *J. Food Sci. Technol. (India)* 23(1); 1986; 42-5

Whole tomatoes (var. (i) Punjab Chuhara and (ii) Punjab Kesri) after steam blanching, were canned in brine at pH 4.2 (control), 2.8, and 1.4 and processed in boiling water for 30 minutes (for pH 4.2) and 15 minutes (for pH 2.8 and 1.4). The pH of the control and acidified canned tomatoes (pH 2.8 and 1.4), after processing changed to 4.06, 3.8, 2.69 in P. Chuhara and 4.05, 3.68, 2.54 in P. Kesri respectively. Ascorbic acid content did not change under different pH; the average drained weight of canned tomatoes at all pH was > 50%. Slight feathering of cans was observed at lower pH. After 6 months storage the canned tomatoes had excellent sensory quality and were well accepted by the consumers. The low pH, short time processing saved about 30% of the energy. The microbial count was nil in pH 4.2 and 1.8, but in pH 2.8 it ranged from 100-400/ml of brine. KAR

FRUITS

- 324 POSSMANN (Ph) and BICKER (R). Processing of stored fruit. Technical concepts and their costs. *Confructa*. 29(2); 1985; 136-68

- 325 DENNIS (C). Chill storage and distribution of fruits and vegetables. *IFST Proc.* 18(1); 1985; 7-14

The article describes the importance of temperature and removal of field heat from fruits and vegetables by vacuum cooling, hydrocooling or positive ventilation, refrigerated storage with optimum temperatures; refrigerated transport, temperature monitoring and use of appropriate package for transport and storage. KAR

- 326 DILLEY (DR). Keeping fruits and vegetables fresh: The removal of ethylene from produce storage chambers. *Activities Rep. R & D Assoc.* 22(1); 1986; 41-2

Discusses: Description of problem, role of ethylene; source of ethylene; assessment and application of storage technology; and assessment of technology for reducing ethylene in the storage atmosphere. BSN

Apples

- 2327 WINTER (F) and WELTE (M). Development of apple production in Europe. *Confructa*. 29(2); 1985; 106-11

- 2328 WILEY (RC). Prediction of apple quality for processing. *Confructa*. 29(2); 1985; 112, 114-9

The quality of apple products (viz. apple juice and apple sauce) is commonly predicted from the following parameters of the apple fruits: (a) % soluble solids; (b) % titratable acidity; (c) firmness; (d) volatility level; and (e) ethylene concentration in the fruit. The sugar/acid ratio and an ascorbic acid analysis are particularly helpful for juice analysis and for pin-pointing the optimum time of harvest for processing. As it is extremely difficult to predict apple sauce quality from raw product tests, only certain minimal standards have been specified: viz. % soluble solids (minimum) 9.5-10%; maximum shear press values of prepared slices should be 750 lbs (force). KMD

- 2329 BARTLEY (IM). Changes in sterol and phospholipid composition of apples during storage at low temperature and low oxygen concentration. *J. Sci. Food Agric.* 37(1); 1986; 31-6

Free sterol and phospholipid in the cortical tissue of apples were determined during storage of the fruits in air at 12 and 3.5 C and in 2 kPa O_2 (98 kPa N_2) at 3.5 C. In air at 12 C, the sitosterol content declined slightly (about 4%) during fruit ripening whilst phospholipid increased about 8%. At 3.5 C in air and 2 kPa O_2 , sitosterol content increased by 16% and phospholipid by 25-31%. The increase in phospholipid in 2 kPa O_2 occurred more slowly than in air. Transfer of apples to air after 33 or 64 days in 2 kPa O_2 led to rapid accumulation of phospholipid in the fruit (20% and 10%, respectively) compared with apples maintained in 2 kPa O_2 . An increase in concentration of phosphatidylcholine (PC) accounted for most of the change observed in total phospholipid. AA

Bananas

- 2330 CHAKRABARTI (DK) and GHOSAL (S). Occurrence of free and conjugated 12,13-epoxytrichothecenes and zearalenone in banana fruits infected with *Fusarium moniliforme*. *Appl. Environ. Microbiol.* 51(1); 1986; 217-9

Three recognized 12,13-epoxytrichothecene mycotoxins, trichothecolone, diacetoxyscirpenol, and T-2 toxin, and a hyperestrogenic factor, zearalenone, together with the fatty acid esters of trichothecolone, scirpenetriol, T-2 tetraol, and zearalenone, were isolated from the flask culture extractives of *Fusarium moniliforme* Sheldon (IMI 225232) as well as from the fruit of bananas (*Musa sapientum* L.) infected with the same fungus in the field and in storage. The total concentrations of these toxins in the naturally infected fruits were quite high (0.8 to 1.0 mg/g of fruit). *F. moniliforme* infections of banana fruits, being of wide occurrence in the world, could cause serious health problems in humans when the infected fruits are ingested for a prolonged period of time. AA

Grapes

- 2331 STRAUSS (CR), DIMITRIADIS (E), WILSON (B), and WILLIAMS (PJ). Studies on the hydrolysis of two megastigma-3,6,9-triols rationalizing the

origins of some volatile C_{13} Norisoprenoids of *Vitis vinifera* grapes. J. Agric. Food Chem. 34(1); 1986; 145-9

Mangoes

- 2332 KHURDIYA (DS) and ROY (SK). Studies on ripening and canning of mangoes. Indian Food Packer. 40(1); 1986; 45-8

The post-harvest losses that occur during ripening of four freshly harvested mangoes ((i) Dashehari, (ii) Mallika, (iii) Amrapali, and (iv) Hybrid-165) and their processing characteristics were investigated. Based on data obtained on physico-chemical parameters (average weight loss, spoilage, brix, acidity, pH, carotenoids) and organoleptic scores (colour, flavour, texture and overall), it was found that 7-9 days was the optimum period needed for ripening and that cultivar (II) gave the best canned product. BSN

- 2333 KALRA (SK), TANDON (DK) and LOHANI (HC). Improving quality of Dashehari mangoes through pre-packaging. Indian Food Packer. 40(1); 1986; 59-63

The fruits of Dashehari variety mango were wrapped in lots of 3 in newspaper and polyethylene, brown paper and butter paper pouches. Wheat straw was used as a conventional material for ripening mangoes. The fruits were partially ripe after 4 days and fully ripe after 6 days of storage, except in polyethylene pouches where the ripening was improper. Slight shrinkage around the shoulders and visible in fruits kept in wheat straw while the three paper packagings produced attractive yellowish green ripe fruits. About 40% fruits were spoiled in polyethylene pouches after 8 days of storage as compared to negligible in other treatments. The physiological loss in weight was lesser and there was optimum development of soluble solids and acidity in the fruits of paper packaging as compared to wheat straw. BSN

- 2334 FOKHARKAR (SM) and PRASAD (S). Storage studies on mango kernel flour. Indian Food Packer. 40(1); 1986; 64-8

Mango kernel flour packed in (i) polyethylene bag, (ii) cloth bag, and (iii) tin container and stored at 30°C, 80% RH for 4 weeks was examined for change in the physical, chemical and organoleptic characteristics (moisture, free fatty acid (FFA) taste and odour). Moisture content of flour in (i) or (ii) did not increase as much as in (iii) and FFA content was maximum in (i) followed in descending order in (ii) and (iii). It has been observed that deterioration of mango kernel flours occurs due to complex biological and chemical reactions. Studies have shown that (ii) or (iii) is the most suitable container for storing mango kernel flour. BSN

Prunes

- 2335 CHEN (C-C), KUO (M-C), LIV (S-E) and WU (C-M). Volatile components of salted and pickled prunes (*Prunus nume* Sieb et Zucc.) J. Agric. Food Chem. 34(1); 1986; 140-44

SUGAR, STARCH AND CONFECTIONERY

Carbohydrates

- 2336 CAHILL (GF) Jr. The future of carbohydrates in human nutrition. Nutr. Rev. 44(2); 1986; 40-43

Discusses: Glucose as the basic carbohydrate unit; glycogen storage; glucose; primitive human diet; challenges for clinical

nutrition; and dietary guidelines for good health. BSN

- 2337 JENKINS (DJA), JENKINS (AL), WOLEVER (TMS), THOMPSON (LH) and VENKAT RAO (A). Simple and complex carbohydrates. *Nutr. Rev.* 44(2); 1986; 44-9

Discusses: Differences in rats of digestion and glycemic response; lente carbohydrates-physiological effects of slowly absorbed carbohydrates; factors affecting starch absorption and glycemic response; and the glycemic index. BSN

- 2338 JEQUIER (E). Carbohydrates: Energetics and performance. *Nutr. Rev.* 44(2); 1986; 55-9

Starch

- 2339 WURZBURG (OB). Nutritional aspects and safety of modified food starches. *Nutr. Rev.* 44(2); 1986; 74-9

Discusses: Chemical starch modification; cross linking as a chemical modification; substitution of monosubstituents groups; and long term toxicity studies of modified starches. BSN

Sugar

- 2340 SHAH (VJ), KAVA (RM), DESAI (NV) and RAO (AV). Sugarcane juice concentration by reverse osmosis. *Indian Sugar.* 35(11); 1986; 593-7

A technical feasibility study was carried out on a small prototype reverse osmosis (RO) plant. The parameters studied included (i) pressure, (ii) feed flow rate, (iii) feed temperature and feed pH. Three pressures (41.3, 55.1 and 60.9 kg/cm²) at flow rates of 8.5 and 10.0 l/minute with feed temperature range of 37 to 45 C were studied. Lower flow rate (8.5 l/minute) needed 20% more time and higher than 10 l/minute was not possible with higher pressure. A feed temperature of 60-65 C, was found optimum since at higher temperature, cellulose membrane is susceptible to hydrolysis. Fouling of membrane is over come by washing at every 8 hour interval, continuous operation at higher temperature and at neutral pH with an efficient filtration system is needed for better performance. KAR

Jaggery

- 2341 GUNJAL (BB) and GALAKATU (PD). Water vapour adsorption by jaggery. *Indian Sugar.* 35(12); 1986; 633-6

Gur or jaggery (crude sugar) obtained from Akola and Parbhani in Maharashtra and Meerut in Uttar Pradesh (India), (moisture content 10.01-15.80%) were exposed to RH of 32.4 to 96.0% at temperatures of 30 and 35 C. The moisture gained or lost by the gur showed that the samples need to be stored at RH of 40-45%. Prediction models of Smith, Henderson, Chung and Pfost, and Bradley were used to predict the relationship between equilibrium moisture content and RH and Bradley's equation was found the most suitable. MVG

Starch

- 2342 AURAND (TJ). Use of starch in retort pouches. *Activities Rep. R & D Assoc.* 38(1); 1986; 87-90

Discusses: Nature of starch; classification; and formulation with modified starch. BSN

BAKERY PRODUCTS

Biscuits

- 2343 WARNER (CR), DANIELS (DH), LIN (FSD), JOE (FL) Jr. and FAZIO (T). Fate of antioxidants and antioxidant-derived products in deep-fat frying and cookie baking. *J. Agric. Food Chem.* 34(1); 1986; 1-5
- Studies with ring-labeled (^{14}C) BHA (2-(1,1-dimethylethyl)-4-methoxyphenol), ring-labeled (^{14}C) TBHQ (2-(1,1-dimethylethyl)-1,4-benzenediol), and (^{14}C) BHT (2,6-bis(1,1-dimethylethyl)-4-methylphenol) were undertaken to determine the fate of these compounds and the associated decomposition products in deep-fat frying and cookie baking. After the equivalent of 12 batches of french-fried potatoes was fried, over 80% of the ^{14}C initially added as ring-labeled BHA was retained by the lard. BHT was more volatile. All three antioxidants underwent extensive decomposition in deep-fat frying. Three conceivable phenolic oxidation products-2-(1,1-dimethylethyl)-2,5-cyclohexadiene-1,4-dione, 2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene-1,4-dione, and 3,3'-bis(1,1-dimethylethyl)-5,5'-dimethoxy-1,1'-biphenyl-2,2'-diol-were not found in the heated lard. High-performance liquid chromatographic analysis demonstrated that, in cookie baking, BHA and BHT are retained by the cookie as intact antioxidants, in contrast to TBHQ, which undergoes 28% decomposition. AA

Bread

- 2344 SELVARAJ (A), LEELAVATHI (K), HARIDAS RAO (F) and SHURPALEKAR (SR). On improving the bread making quality of flour from field sprouted wheat. *J. Food Sci. & Technol. (India)* 23(1); 1986; 24-9
- Wheat damaged by rain during harvest in the field gives sticky dough and poor quality bread. This is due to the increase in the alpha amylase activity which lowers the falling number of amylograph peak viscosity. Additives like sodium chloride (2%), non-fat dry milk (NFDM), (3%), sodium stearoyl-2-lactylate (SSL) (0.5%), glyceryl-monostearate (GMS) (0.5%), disodium hydrogen phosphate (DHP) (0.9%) trisodium phosphate (TP) (0.3%), enzyme active soy flour (0.5%), potassium bromate (0.001%), lecithin (0.5%) and potassium bromate (0.001%) along with cysteine (0.003%) were added to rain soaked wheat flour to improve the bread quality. Fermentation time studies was 120, 90, 60 and 30 minutes. Stickiness of the dough prepared from rain damaged wheat could be reduced by (i) use of 2-3% salt, (ii) reducing the water in the dough by 2-4% (iii) reducing the fermentation time from 165 minutes to 60-90 minutes and (iv) reducing initial dough temperature to 17-20 C. Enzyme active soy flour, SSL, GMS and cysteine hydrochloride considerably improved dough properties and bread from field sprouted wheat. DHP and TP improved dough properties, but not bread quality. KAR
- 2345 LEUNG (HK). Bread quality: Effects of water binding ingredients. *Activities Rep. R & D Assoc.* 38(1); 1986; 43-8
- Discusses: Humectants; dough mixing properties; breadmaking properties; bread staling; challenge study; and storage stability tests. BSN
- 2346 KADAN (RS) and ZIEGLER (GM) Jr. Effects of ingredients on iron solubility and chemical state in experimental breads. *Cereal Chem.* 63(1); 1986; 47-57
- Iron distribution in experimental breads fortified with ferrous sulfate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$), ferric sodium pyrophosphate, electrolytic

iron and other breadmaking ingredients at two (usage) levels, showed that it was influenced by the medium, amount and type of ingredient in the bread. The other active ingredients affecting soluble iron were, shortening, NaCl and non fat dry milk in aqueous slurry; shortening and sugar in the stomach conditions and yeast and NaCl in the simulated medium. Soluble iron decreased by high levels of NaCl level and increased by high yeast levels in duodenum conditions. *In vitro* studies have confirmed the bioavailability of iron as influenced by high NaCl and yeast levels. BSN

- 2347 HADDAD (PR) and JACKSON (PE). The determination of ascorbate, bromate and metabisulphite in bread improvers using high performance ion-exchange chromatography. *Food Technol. Aust.* 37(7); 1985; 305-7, 317

- 2348 BAKER (AE), DOERRY (WT) and KEMP (F). Instron factors involved in measuring crumb firmness. *Cereal Food World.* 31(2); 1986; 193-5

The firmness of many samples of white pan bread was measured with the Instron universal food testing machine (model 1000). The testing conditions were varied to determine the effects of specific factors on the measured Instron force. The crosshead speed (rate of compression) degree (%) of compression, and the compression plunger area were each found to be significant factors affecting the Instron force values. Statistical analysis of data showed no significant difference in the measured crumb firmness of one 25 mm slice and two 12.5 mm slices of bread. KAR

- 2349 SCHIEBERLE (F) and GROSCH (W). Identification of the volatile flavour compounds of wheat bread crust. Comparison with rye bread crust. *Z. Lebensmittel Unters. Forsch.* 180(6); 1985; 474-8

Dough

- 2350 WATSON (FS) and WALKER (CE). The effect of sucrose esters on flour water dough mixing characteristics. *Cereal Chem.* 63(1); 1986; 62-4

Brabender farinograph and National mixograph studies have shown that addition of emulsifiers tended to reduce the time to peak of the farinogram and increased the mixing endurance. However, it did not exert any influence on absorption. Mixogram optimum mix times increased when sucrose esters were present. BSN

MILK AND DAIRY PRODUCTS

- 2351 KUNZ (B) and BLUMEL (W). Examinations about the production of concentrated cultures for dairy. *Lebensmittelindustrie.* 32(2); 1985; 76-7 (German)

Milk

- 2352 SHAMSUZZAMAN (K) and HAARD (NF). Failure of Sepharose-pepsin as an immobilized milk clotting enzyme. *J. Food Biochem.* 10(1); 1986; 17-35

- 2353 KRAUSE (W), HERRMANN (H) and MULLER (F). Instrumental recording of the coagulation time of milk for the ascertainment of the rennet activity. *Lebensmittelindustrie.* 32(2); 1985; 74-6 (German)

- 2354 HEWEDI (MM), MULVIHILL (DM) and FOX (PF). Recovery of milk protein by ethanol precipitation. *Ir. J. Food Sci. Technol.* 9(1); 1985; 11-23

- 2355 MUCOH (B) and SKAARE (JU). Gas chromatographic determination and mass spectrometric confirmation of malathion in milk and blood.

Food Chem. 34(1); 1986; 87-8

Butter

- 2356 PRASAD (C) and BHANUMURTHI (JL). Shelf-life of anhydrous (dry) butter fat made under different conditions of thermal clarification of centrifugally separated melted butter. *J. Food Sci. Technol. (India)* 23(1); 1986; 60-62

Anhydrous (dry) butter fat was prepared by thermal clarification of centrifugally separated melted butter with 1.05% moisture content in a ghee pan at time temperature combinations of (i) 85 C/45 minutes, (ii) 90 C/30 minutes and (iii) 90 C/45 minutes. After filtering, they were stored in lacquered tins of 250 ml at 30 ± 1 C and 37 ± 1 C for 3 months. Recombined milk with 3.1% fat was prepared from the stored anhydrous fat and evaluated organoleptically. Free fatty acid content and thiobarbituric acid value increased during storage in all samples. (ii) was found superior organoleptically by the panel of judges. Recombined milk prepared from (ii) also showed maximum average score both initially and after storage at both the temperatures. KAR

- 2357 PALMER (J). Waste losses in effluent from butter plants. *Ir. J. Food Sci. Technol.* 9(1); 1985; 25-32

Cheese

- 2358 NEY (KH). Flavour of Tilsit cheese. *Fette Seifen Anstrichm.* 87(7); 1985; 289-94 (German)

Yoghurt

- 2359 WILKINS (DW), SCHMIDT (RH) and KENNEDY (LB). Threonine aldolase activity in yoghurt bacteria as determined by headspace gas chromatography. *J. Agric. Food Chem.* 34(1); 1986; 150-52

Whey

- 2360 GREENBERG (R) and DOWER (HJ). Detection of added whey protein concentrate in nonfat dry milk by amino acid analysis. *J. Agric. Food Chem.* 34(1); 1986; 30-32

Amino acid analysis of nonfat dry milk (ndm) acid hydrolyzates with computer handling enables detection at levels of > 10% added whey protein concentrate (WPC). The method is amenable to automation values in microgram percent for the amino acids - aspartic acid, alanine and proline are used as markers for both the screening procedure (simple acceptance, or rejection) of NDM samples and for quantitative estimation of adulteration. BSN

MEAT AND POULTRY

Beef

- 2361 OTTO (E). On the fat content of beef and pork. Part I. *Ernährungsforschung.* 31(1); 1986; 24-5 (German)

The rise in consumption of beef and pork during the period 1950-1983 has been traced; a very rapid increase has occurred during the past decade, and the trend is still slightly upwards. The protein and fat content of lean and fat beef and pork have been reported; the caloric, protein, fat, and moisture contents of other meats (veal, lamb, chicken, turkey) have also been tabulated. Finally, the energy, fat content of certain types of cooked meat (roast beef,

broiled roasts, roulades, cutlets, schnitzel) have also been reported.
KMD

- 2362 FINDLAY (CJ), STANLEY (DW) and GULLETT (EA). Thermomechanical properties of beef muscle. *Meat Sci.* 16(1); 1986; 57-70
- Differential scanning calorimetry (DSC) was used to follow the three major endothermic transitions (T1, T2 and T3) of beef muscle during heating. Borchardt and Daniels reaction kinetics were used to predict the three time and temperature treatments required to sequentially eliminate each transition. *Longissimus dorsi* and *Semimembranosus* muscles were removed from beef carcasses suspended by Achilles tendon or pelvis. Samples prepared by heating for 5 minutes at 57°C (I), 70°C (II) and 81°C (III) were assessed by sensory panel for tenderness, juiciness and residual connective tissue. Weight loss Warner-Bratzler (W-B) shear and microstructure using transmission electron microscopy (TEM) were also determined. The I treatment showed significant difference in tenderness and residual connective tissue between muscles, but not between contraction states. The II treatment produced collagen shrinkage and a significant drop in W-B shear and residual connective tissue, coupled with increased tenderness in semimembranosus muscle. An increased W-B value, decreased juiciness increased weight loss and a reduction in sarcomere and A-band length accompanied the III transition. Muscles from carcasses that had been suspended by the pelvis were found to be significantly more tender than the same muscles from Achilles hung carcasses. It is concluded that DSC is capable of determining amount of protein denaturation and hence, degree of cooking.
- 2363 GOTTESMANN (P) and HAMM (R). Lipoamide dehydrogenase, citrate synthase, and β -hydroxyacyl-CoA-dehydrogenase of skeletal muscle. XII. Influence of electrical stimulation of beef carcasses on activity and subcellular distribution. *Z. Lebensmittel Unters. Forsch.* 181(6); 1985; 478-81 (German)
- 2364 RENK (BZ), KAUFFMAN (RG) and SCHAEFER (DM). Effect of temperature and method of cooking on the retention of intramuscular lipid in beef and pork. *J. Anim. Sci.* 61(4); 1985; 876-81
- 2365 FINDLAY (CJ), PARKIN (KL) and STANLEY (DW). Differential scanning calorimetry can determine kinetics of thermal denaturation of beef muscle proteins. *J. Food Biochem.* 10(1); 1985; 1-15
- 2366 OBANU (ZA). Evaluation of dye reduction as a quality index for raw meat under tropical conditions. *J. Food Sci. Technol. (India)* 23(1); 1986; 46-8
- The reduction time of methylene blue and resazurin dyes was used to monitor total viable counts in beef and pork packaged in polythene bags or kept loose and stored on bench-top under ambient conditions as for meat under sale in Nigerian open-air markets or under storage in homes without refrigeration. Results show a nearly linear inverse relationship between total viable counts and dye reduction times. The highly significant ($p < 0.01$) negative correlation ($r > 0.93$) obtained suggests dye reduction test to be a useful rapid indicator of the microbiological quality of raw meat, packaged or unpackaged, under ambient tropical (Nigerian) conditions. Both dye reduction time and the viable count were better for packaged than unpackaged meat showing the relative efficiency of simple polythene packaging in enhancing microbiological quality. Each of the dyes studied appeared as good as the other. AA

Cattle

- 2367 EICHHORN (JM), WAKAYAMA (EJ), BLOMQUIST (GJ) and BAILEY (CM). Cholesterol content of muscle and adipose tissue from crossbred bulls and steers. *Meat Sci.* 16(1); 1986; 71-8
- 2368 EICHHORN (JM), BAILEY (CM) and BLOMQUIST (GJ). Fatty acid composition of muscle and adipose tissue from crossbred bulls and steers. *J. Anim. Sci.* 61(4); 1985; 892-904
- 2369 SLINDE (E) and KRYVI (H). Z-disc digestion of isolated bovine myofibrils by an endogenous calcium activated neutral proteinase. *Meat Sci.* 16(1); 1986; 45-55

Lamb

- 2370 PETERSON (GV), CARR (DH), DAVIES (AS) and PICKETT (BT). The effect of different methods of electrical stunning of lambs on blood pressure and muscular activity. *Meat Sci.* 16(1); 1986; 1-15
- 2371 BREWER (MS), JOHNSON (CC) and FIELD (RA). Influence of NaCl level and freezing on actin and myosin content of exudate from chunked and formed lamb roasts. *J. Food Qual.* 9(1); 1986; 21-30
- Roasts prepared from frozen lean had lower shear values and Instron peak loads than did roasts prepared from fresh lean. Freezing of lean prior to processing, lowered percentage of actin in exudate, but significant NaCl level x freezing interactions existed for percentage actin and myosin. Increasing NaCl levels from 0.5 to 2.0% decreased cooking loss in all roasts made from fresh and frozen meat and increased Instron measures of bind in roasts made from fresh, but not frozen meat. KAR

Pork

- 2372 SWATLAND (HJ). Development of rigor mortis in intact sides of pork measured with a portable rigorometer. *J. Anim. Sci.* 61(4); 1985; 882-6
- 2373 SWATLAND (HJ). Optical and electronic methods of measuring pH and other predictors of meat quality in pork carcasses. *J. Anim. Sci.* 61(4); 1985; 887-91
- 2374 WILKEN (C), BALTES (W), MEHLITZ (I), TIEBACH (R) and WEBER (R). Description of a method for the determination of ochratoxin A in pork kidneys. *Z. Lebensmittel Unters Forsch.* 180(6); 1985; 496-7 (German)

Ham

- 2375 ANJANEYULU (ASR) and SMIDT (HD). Packaging under carbon dioxide and dinitrogen oxide on the quality of processed ham. *Indian Food Packer.* 40(1); 1986; 40-44
- The effect of different modified atmospheres (i) 35% CO₂ + 65% N₂; (ii) 35% CO₂ + 65% N₂O; (iii) 100% CO₂; (iv) 100% N₂O and (v) 95% CO₂ + 5% N₂O on pH, colour, smell and total bacterial counts of processed ham slices stored at 3-5 C for 30 days was studied. Bacterial counts did not increase during storage in (iii), although the colour intensity showed a decline. The bacterial count and colour of hams packed in (i) remained almost the same during the storage period (iv) did not inhibit growth of bacteria in hams. BSN

Hamburger

- 2376 CHAVEZ (J), HENRICKSON (RL) and RAO (BR). Collagen as a hamburger extender. *J. Food Qual.* 8(4); 1986; 265-72

Bovine hide collagen was added to ground beef at 0, 10 or 20% level replacing lean meat and stored at -15 C up to 2 weeks. Beef patties with collagen were found to be superior in juiciness by the taste panel, while the flavour, texture and overall acceptability decreased as the collagen level increased. KAR

Poultry

- 2377 RUKMANGADHAN (S). Poultry meat in human nutrition. *Foult. Guide.* 23(4); 1986; 83-9

The nutritional aspects of poultry meat is discussed in detail including factors influencing the nutrient composition, importance of animal protein in human nutrition, protein, energy, fat, cholesterol, vitamin, minerals and some special attributes of poultry meat. KMD

Chicken

- 2378 PERCHONOK (MH) and REGENSTEIN (JM). Stability at comminution chopping temperatures of model chicken breast muscle emulsions. *Meat Sci.* 16(1); 1986; 17-29

- 2379 PERCHONOK (MH) and REGENSTEIN (JM). Stability at cooking temperatures of model chicken breast muscle emulsions. *Meat Sci.* 16(1); 1986; 31-43

Emulsion stability (ES) was measured on timed emulsification (TE) samples made with natural actomyosin (NAM) and exhaustively washed (EW) muscle, heated to 75 C, before using the Omni-mixer or after centrifugation. All emulsions cooked after centrifugation were found to be stable. The emulsions made with NAM showed a large decrease in ES when heated above 40 C prior to using the Omni-mixer. However, aqueous protein disappearance did not decrease significantly after TE until NAM was heated to between 60 C and 75 C. On the other hand, emulsions made with EW muscle heated prior to using the Omni-mixer showed a large decrease in both ES and aqueous protein disappearance after TE between 60 C and 75 C. AA

- 2380 DECKER (EA) and SCHANUS (EG). Catalysis of linoleate oxidation by soluble chicken muscle proteins. *J. Am. Oil Chem. Soc.* 63(1); 1986; 101-4

A soluble fraction of a chicken *Musculus gastrocnemius* muscle was used to characterize the catalyst of linoleate oxidation. Separation of the chicken muscle extract into low (free metal) and high (protein) molecular weight fractions revealed that the molecular weight of the major catalyst of linoleate oxidation in chicken muscle extract was greater than 700 daltons. Catalysis of linoleate oxidation by the protein fraction exhibited a pH optimum of 5.9. Subjecting the protein fraction to heat treatments at increasing temperatures (30-90 C) decreased the catalysis of linoleate oxidation. Addition of two mM EDTA had no effect on the catalysis of linoleate oxidation. Cyanide (2 mM), glutathione (1 mM) and cysteine (1 mM) decreased the oxidation of linoleate by the protein fraction 21.0%, 22.9% and 29.0% respectively. Characterization of the oxidative catalyst in chicken muscle extract indicated that free metals and hemoproteins contribute to overall catalysis of linoleate oxidation but are not the sole catalysts. Heat inactivation of the oxidative catalyst and the observed pH optimum suggests that the unidentified catalyst is proteinaceous and may be an enzyme. AA

Eggs

- 2381 LITTMANN (S). On the chemo-analytical examination of egg products and evaluation of their hygienic condition on the basis of specific-decay organic acids. *Dtsch. Lebensmittel-Rundsch.* 81(11); 1985; 345-50 (German)

The hygienic condition of egg products before pasteurisation can be evaluated by determination of the contents of succinic acid as specific indicator for microbial decomposition and β -Hydroxybutyric acid, indicating fertilized incubated eggs. Both kinds of deterioration are accompanied by an increase in the concentration of lactic acid. The gas chromatographic method for the determination of the methyl derivatives, as described, is suitable for all egg products, even for those to which sugar and salt have been added. The addition of food preservatives can be detected simultaneously. Basic criteria for evaluation and limiting concentrations for edible material are explained. AA

- 2382 SUGINO (K), TERAO (J), MURAKAMI (H) and MATSUSHITA (S). High-performance liquid chromatographic method for the quantification of cholesterol epoxides in spray-dried egg. *J. Agric. Food Chem.* 34(1); 1986; 36-9

By using reversed HPLC, the simple and sensitive method for quantification of cholesterol epoxides in egg products involves addition of total lipids to a disposable column containing silica to obtain the cholesterol fraction and the subsequent derivatization with p-nitrobenzoyl chloride prior to HPLC separation. In commercial spray dried eggs, α - and β -cholesterol levels were 0.1 and 0.2% of cholesterol respectively. BSN

SEAFOODS

Fish

- 2383 SINGH (PP), VINITA RATHORE and SINGH (LBK). A possible role of fish preparation 'Hentak' in urolithiasis in Manipur - an experimental study. *Indian J. Exp. Biol.* 24(2); 1986; 88-90

Effect of feeding fish preparation 'Hentak' (made from fish and colocasia stems) (containing (g/100 g): Ca, 10.75; Mg, 1.01; oxalic acid, 1.17; P, 5.25; protein, 41.70; and water, 22.62), a common ingredient of the diet of Manipur people suffering from high prevalence of stone disease, was studied to evaluate its role in urolithiasis in albino rats. Hentak (2%) feeding did not affect Ca excretion, but increased the excretion of oxalic acid (significant on 30th day), uric acid (significant on 10th, 30th, and 40th day), hydroxypyroline (significant on 30th, 40th and 50th day) and P (significant on 10th, 30th and 40th day), Mg excretion was also high in this group (significant on 30th, 40th and 50th day). Serum Ca and P level were unaffected, but Mg level was low and uric acid level was high in experimental rats. Calculogenic effect on Hentak preparation is suggested. AA

- 2384 SANO (T), NOGUCHI (SF), TSUCHIYA (T) and MATSUMOTO (JJ). A new method to evaluate gel properties of fish meat gel products. *Bull. Jpn. Soc. Sci. Fish.* 52(1); 1986; 109-14

The new method involves stretching test, using a film shaped gel sample Ca 1 mm thick as test piece. The method can be applied to small amount of samples and less than 500 mg of sample was needed for one measurement. It had high accuracy and reproducibility. KAR

- 2385 WEBER (O). Concentration of metals in fish from the river Rednitz. Z. Lebensmittel Unters Forsch. 180(6); 1985; 463-6 (German)

Beche-de-mer

- 2386 JAMES (DB). Quality improvement in Beche-de-mer. Seafood Exp. J. 18(3); 1986; 5-8, 10

Beche-de-mer or trepang is the commercial name given to sea cucumbers. The most valuable sp. among them - in descending order of quality - are the teat fish (*Holothuria (Microthale) nobilis*), the prickly fish (*Thelenota ananas*), black fish (*Actinopyga miliaris*) and sand fish (*Holothuria (Metriatyla) scabra*). The latter is the most commonly found sp. Details relating to the size, appearance, shape, colour, odour, handling, processing, packaging and forwarding of these species have been given, with the objective of ensuring a final product of good quality. KMD

Carp

- 2387 NAMBU DIRI (D), BEHNAN (L) and VANAJA (K). A method for the preparation of carp fillets free of muddy odour. Seafood Exp. J. 18(2); 1986; 15-17

Fillets of major Indian carps tend to have a muddy odour which make them unacceptable in foreign markets. The muddy odour can be removed by dipping the fillets in a chilled (< 5°C) brine of strength 1%, for 5 minutes. This leaching in brine removes the excess blood and dark patches that may be present in the fillets. The fillets are then wrapped in 150 gauge, low-density polyethylene, pressed into 1 kg blocks and quick frozen. This procedure is more convenient than the removal of the mud vein, as suggested earlier. KMD

- 2388 OKADA (T), INOUE (N) and AKIBA (M). Increasing loss of the bound nucleotide contents of carp myosin B during frozen storage. Bull. Jpn. Soc. Sci. Fish. 52(1); 1986; 121-6

The bound nucleotide consisted predominantly of ADP. The bound nucleotide of the myosin B was partially or lost completely during the frozen storage and the extent of decrease depended on the initial KCl concentration before freezing and the storage temperature. Na-glutamate inhibited the decrease to a large extent. It is concluded that the decrease of the bound nucleotide during frozen storage seems to be mainly due to the concentration effect of salt. KAR

Caviare

- 2389 REHBEIN (H). Caviare: Proximate composition, amino acid content and identification of fish species. Z. Lebensmittel Unters. Forsch. 180(6); 1985; 457-52

Hake

- 2390 ALMANDOS (ME), GIANNINI (DH), CIARLO (AS) and BOERI (RL). Formaldehyde as an interference of the 2-thiobarbituric acid test. J. Sci. Food Agric. 37(1); 1986; 54-8

The conclusion reached with the experiment prove that formaldehyde contents over 25 µg/ml extract interfere with the colorimetric determination during the storage of frozen blocks of Palagonian hake (*Merluccius hubbsi*) filleted and minced. KAR

Sardines

- 2391 YAMANAKA (H), SHIMAKURA (K), SHIOMI (K) and KIKUCHI (T). Changes in non-volatile amine contents of the roasts of sardines.

during storage. *Bull. Jpn. Soc. Sci. Fish.* 52(1); 1986; 127-30

Changes in contents of seven non-volatile amines, putrescine (Put), cadaverine (Cad), tyramine (Tym), tryptamine (Tpm), spermine and histamine (Hm) were examined in the meats of sardine *Sardinops melanostica* and saury pike *Cololabis saira* during storage at 5 C or 20 C. The levels of Put, Cad, Tym and Tpm in the meats of these fishes increased as decomposition progressed, regardless of storage temperature. Of these four amines, a maximum formation was observed for Cad, which seems to be the most useful index for decomposition of fish; below 15 mg/100 g of meat at the passable stage, between 15 and 20 mg/100 g of meat at the stage of initial decomposition and over 20 mg/100 g of meat at the stage of advanced decomposition. Since Hm formation varies greatly with fish species and storage temperatures, the use of Hm as a chemical index for decomposition of fish is not always proper. AA

Shark

- 2392 GOPAKUMAR (K) and THANKAPPAN (TK). Squalene, its source, uses and industrial applications. *Seafood Exp. J.* 18(3); 1986; 17,19,21

Shark liver oil is a natural source of the hydrocarbon, squalene, which has been used for preparing health food called **squalene powder**. The recent report that squalene can be used for the synthesis of a number of steroid hormones is likely to increase considerably the price of shark liver oils. Hence, the authors have listed the various physical and chemical properties of squalene, and described its commercial extraction from shark liver oil. Twelve different types of sharks which have a high squalene content in their livers have been tabulated. KMD

Sprats

- 2393 FALANDYSZ (J). Organochlorine pesticides and polychlorinated biphenyls in sprats from the Southern Baltic, 1983. *Z. Lebensmittel Unters Forsch.* 181(6); 1985; 482-5

Trout

- 2394 MORAL (A), TEJADA (M) and BORDERIAS (AJ). Stability of frozen trout I. Treated and untreated minces stored at -12, -18 and -24 C. *J. Food Biochem.* 10(1); 1986; 37-46

Minced trout, either untreated or treated with additives (3% sorbitol + 0.5% MSG + 0.02% BHA + BHT (fat content), was found to be acceptable over one-year's storage at either -12, -18, or -24 C. The treated samples maintained optimum quality levels over the entire period at each of the storage temperatures tested. Quality was assessed by both objective and subjective methods. AA

- 2395 TEJADA (M), BORDERIAS (AJ) and MORAL (A). Stability of frozen trout. II. Different trout preparations stored at -18 C. *J. Food Biochem.* 10(1); 1986; 47-53

Oysters

- 2396 EYLES (MJ), DAVEY (GR), ARNOLD (G) and WANE (HM). Evaluation of methods for enumeration and identification of *Vibrio parahaemolyticus* in oysters. *Food Technol. Aust.* 37(7); 1985; 302-4

Alkaline peptone water (APW) gave greater recovery of *V. parahaemolyticus* than did Glucose Salt Teepol broth (GSTB) or arabinose ethyl violet broth (AEB). The most probable member (MPN) method, with APW as the enrichment medium, gave greater recovery of *V. parahaemolyticus* than did a spread plate count on thiosulphate citrate bile salts

sucrose agar. VF medium was found to be useful for biochemical screening of presumptive *V. parahaemolyticus*. KAR

Prawns

- 2397 SANTHANA KRISHNAN (G). Examination of frozen shrimp. I. Organoleptic examination. *Seafood Exp. J.* 18(3); 1986; 11-2

The method, specified by the U.S. Food & Drug Administration for the quick detection of decomposition odour in large and small frozen shrimps, and for their grading in accordance therewith has been described. Three categories based on the odour have been suggested. KMD

PROTEIN FOODS

- 2398 REGE (SJ), KULKARNI (PR) and REGE (DV). Nutritive evaluation of high protein foods. *J. Food Sci. Technol. (India)* 23(1); 62-64

PER of five high protein foods containing solvent extracted and heated soy flour, vegetable protein isolate and groundnut protein hydrolysate were evaluated. Casein based protein food had a PER slightly higher than that of the reference protein, whereas the preparation based on predigested milk protein had a PER of about 75% of that of casein. Preparation containing predigested soy flour gave a highest PER of 2.3 compared to the one prepared by solvent extracted soy flour. Preparations based on groundnut protein isolate and groundnut protein hydrolysate and skim milk powder did not sustain the growth of weanling rats. KAR

FRUIT JUICES AND BEVERAGES

Fruit juices

- 2399 JANDA (W). The use of enzymes to increase juice yield in different extraction procedures with liquefying enzymes. *Confructa*. 29(2); 1985; 125-7
- 2400 WENZEL (L). The importance of the belt presses as preliminary pressing stage (in juice extraction). *Confructa*. 29(2); 1985; 120-24
- 2401 KAUSCHUS (U) and THIER (H-P). The composition of soluble polysaccharides in fruit juices. II. Other juices. *Z. Lebensmittel Unters. Forsch.* 181(6); 1985; 462-6 (German)

Apple juices

- 2402 LEHMANN (H) and WEBER (ST). About the optimum application of gelatine and silica sol for the clarification of apple juice. *Lebensmittelindustrie*. 32(2); 1985; 72-3 (German)

Cranberry juices

- 2403 HONG (V) and WROLSTAD (RE). Cranberry juice composition. *J. Assoc. Off. Anal. Chem.* 69(2); 1986; 199-207
- 2404 HONG (V) and WROLSTAD (RE). Detection of adulteration in commercial cranberry juice drinks and concentrates. *J. Assoc. Off. Anal. Chem.* 69(2); 1986; 208-13

Marula juices

- 2405 PRETORIUS (V), ROHWER (E), RAPP (A), HOLTZHAUSEN (LC) and MANDERY (H). Volatile flavour components of Marula Juice. *Z. Lebensmittel Unters. Forsch.* 181(6); 1985; 458-61

Cocoa

- 2406 KNEZEVIC (G). Heavy metals in foodstuffs. Part 4. On nickel contents in raw cocoa and in finished and semi-finished cocoa products. *Dtsch. Lebensmittel-Rundschau.* 81(11); 1985; 362-4 (German)

Tea

- 2407 SRIVASTAVA (RAK). Polyphenol oxidase activity in the development of acquired aroma in tea (*Thea sinensis* var. *Assamica* L.). *Curr. Sci.* 55(6); 1986; 284-7

Partially purified polyphenol oxidase from fresh tea leaves was found to form aldehydes from amino acids (alanine, valine, and leucine) in the presence of (+) - catechin or other diphenols. These aldehydes contribute to the development of aroma in tea. The formation of aldehyde was proportional to the concentration of amino acid, polyphenol oxidase and (+) - catechin. However, concentration of > 0.3 mM of (+) - catechin was detrimental to aldehyde formation as the substrate gets saturated. Diethyldithiocarbamate inhibited polyphenol oxidase activity and aldehyde formation. The K_m for (+) - catechin was found to be 0.184 mM. (+) - catechin oxidation and aldehyde formation were inhibited by the addition of diethyldithiocarbamate, but addition of CO_3^{2+} restored them. Diethyldithiocarbamate inhibited polyphenol oxidase activity non-competitively. KAR

Coffee

- 2408 HUCKE (J) and MAIER (HG). Quinic acid lactone in coffee. *Z. Lebensmittel Unters Forsch.* 180(6); 1985; 479-84 (German)

- 2409 TRUGO (LC) and MACRAE (R). An investigation of coffee roasting using high performance gel filtration chromatography. *Food Chem.* 19(1); 1986; 1-9

Changes in the molecular weight distribution of components in green coffee during roasting were investigated. The chromatograms obtained with refractive index detection showed significant differences in molecular weight profiles. UV detection showed similar patterns at 280 and 325 nm, suggesting that phenolic compounds were probably bound to proteins. The use of HPGFC provided a more rapid analysis compared with traditional gel filtration and proved to be useful in monitoring changes in molecular weight which occur during coffee roasting. KAR

- 2410 SAH (NK) and KESAVAN (PC). On the mechanism of differential modification of oxygen dependent and independent radiation damage in *Hordeum vulgare* by caffeine. *Indian J. Exp. Biol.* 24(1); 1986; 23-5

- 2411 LECLERCQ (E) and NETJES (JJ). Release of sesquiterpene lactones by enzymatic liquefaction of chicory roots. *Z. Lebensmittel Unters Forsch.* 181(6); 1985; 475-7

- 2412 RAJASEKHARAN (T), VITTAL RAD (AS), ABRAHAM (KO) and SHANKARANARAYANA (ML). Analysis of coffee-chicory blends. *Indian Coffee.* 50(1); 1986; 19-24

Samples of coffee, chicory, and coffee-chicory blends were analyzed for moisture, ash, water-soluble matter, and caffeine content.

The coffee samples and chicory samples were found to conform to Indian Standard specifications. Indian food laws permit the use of chicory in coffee powder, provided the caffeine content of the mixture is not $< 0.6\%$, and the water-soluble content of the mixture not $< 60\%$. These specifications would limit the chicory content of a blend to 60% if admixed with arabica coffee; but the chicory content may exceed 60% if the blend is made with robusta coffee. Thus, it is desirable to specify a maximum chicory content in a chicory-coffee blend; but, it is not possible to enforce such a specification in the absence of a reliable quantitative method of determination of chicory. Hence, the authors suggest that pure coffee and chicory powders should be separately, leaving it to the consumer to prepare his own blends. KMD

Fruit brandies

- 2413 BINDLER (F) and LAUGEL (P). New tests to identify fruit brandies. *Dtsch. Lebensmittel-Rundschau*. 81(11); 1985; 350-56 (German)

A large number of aromatic compounds (terpenes, esters, and alcohols) were isolated from the distillates (brandies) prepared from 4 fruits, viz. mirabelle plums, plums, spiced traminer grape marc, and cherries. The average composition of aromatic compounds in each of these distillates was distinctly different from that of the others; in other words, a "typical profile" was obtained for each distillate. An attempt has been made - by using certain mathematical criteria and coordinate systems, and without using a computer - to separate the brandies into different classes, and to improve the earlier method of identification (based on discriminant analysis) by measuring the contents of higher alcohols and methanol. KMD

Brewery

- 2414 GRAGER (B), JAHRIG (A) and SCHADE (W). Examinations about the application of the particle counter laborscale PSL-1 for the recording of the contaminating organisms in brewery. *Lebensmittelindustrie*. 32(2); 1985; 79-82 (German)

Hop

- 2415 LAM (KC), NICKERSON (GB) and DEINZER (ML). A rapid solvent extraction method for hop essential oils. *J. Agric. Food Chem.* 34(1); 1986; 63-6

Wines

- 2416 INTERESSE (FS), D'AVELLA (G), ALLOGGIO (V) and LAMPARELLI (F). Mineral contents of some Southern Italian wines. II. Determination of Li, Na, Mg, K, Ca, Co, As, Rb, Sr, Ag, Sb, Ba. *Z. Lebensmittel Unters. Forsch.* 181(6); 1985; 470-74

OILS AND FATS

- 2417 JACKSON (HW), MIRMIRA (GK) and WAGNER (WM). Oxidative oil stability using volatiles methodology. *J. Am. Oil Chem. Soc.* 63(1); 1986; 117-8
- An accelerated oil oxidation procedure was used with the assessment of volatiles via gas chromatography to measure oil stability. This procedure utilized a mixture of oxygen and nitrogen as the purge gas. Preliminary results have shown good agreement with the standard AOM oxidative stability test. AA

Cucurbit seed oils

- 2418 GOODMAN (LA) and BERRY (JW). Phospholipids of three xerophytic cucurbit seed oils. *J. Am. Oil Chem. Soc.* 63(1); 1986; 98-101

The composition of seed phospholipids was determined in three species of xerophytic cucurbits, *Cucurbita digitata* Gray, *C. foetidissima* HBK and *Apodanthera undulata* Gray. The phospholipid fractions were isolated using silicic acid chromatography and quantitated by colorimetric analysis. The component phospholipids were separated using thin layer chromatography. All three species contained phosphatidylcholine, phosphatidylethanolamine and phosphatidylinositol as their major component phospholipids. Analysis by gas liquid chromatography of fatty acids in total phospholipid samples revealed linoleic acid as the major component and myristic acid insignificant amounts in each species. Small amounts of conjugated unsaturated fatty acids in the phospholipids of each species were determined by ultraviolet spectrometry. Close similarities in the composition of specific phospholipids were found in all species. AA

Linseed oils

- 2419 SEBEDIO (JL). Application of methoxy-bromomeric-adduct fractionation to the study of cyclic fatty acid monomers from a heated linseed oil. *Fette Seifen Anstrichm.* 87(7); 1985; 267-73

Rapeseed oils

- 2420 BENGTSOON (L). Some experiences of using different analytical methods in screening for oil and protein content in rapeseed. *Fette Seifen Anstrichm.* 87(7); 1985; 262-4

Fats

- 2421 VINAY JAMBHULKAR, PUROHIT (HJ) and SHANKHAPAL (KV). Production of lipids by moulds grown on industrial and agricultural wastes. *Indian J. Technol.* 24(3); 1986; 165-6

Four mould cultures, *Rhizopus nigricans*, *Mucor* sp., *Penicillium javanicum* and *Penicillium* sp., were tested for production of lipids using waste materials such as rice bran, wheat bran, molasses, tamarind seed powder, mango seed powder, subabul seed powder and whey as carbon sources. *Rhizopus nigricans* gives significant growth and lipid production on all the different waste materials used. Rice bran, tamarind seed powder and molasses, when used as a carbon source, yield more oil than the other waste materials. KMD

- 2422 KWON (DY) and RHEE (JS). A simple and rapid colorimetric method for determination of free fatty acids for lipase assay. *J. Am. Oil Chem. Soc.* 63(1); 1986; 89-92

A simple and rapid colorimetric method was developed to determine the lipase activity for fat splitting. Free fatty acids produced by lipase from triacylglycerols were determined by observing the colour developed using cupric acetate-pyridine as a colour developing reagent. This modified method requires only a few minutes to determine the free fatty acids, whereas it takes over 20 minutes by the conventional methods which require solvent evaporation and centrifugation steps. The sensitivity and reproducibility of the method were good for caproic, caprylic, capric, lauric, myristic, palmitic, stearic and oleic acids. AA

- 2423 ANSARI (MH), AHMAD (F) and AHMAD (M). Addition of phthalimidonitrene to acetylenic fatty acid esters: Synthesis of long-chain 2-phthalimido-2H-azirines. *J. Am. Oil Chem. Soc.* 63(2); 1986; 92-5

Lead tetraacetate (LTA) oxidations of N-aminophthalimide in the presence of acetylenic fatty acid esters have resulted in the formation of corresponding 1H-azirines that spontaneously rearranged to give 2H-azirines in moderate yields. 2H-Azirine derivatives (IV, V and VI) of acetylenic fatty acid esters, methyl 10-undecynoate (I), methyl 9-undecynoate (II) and methyl 9-octadecynoate (III), respectively have been prepared and characterized with the help of spectral and micro analyses. AA

- 2424 OBORN (RE) and ULLMAN (AH). A capillary gas chromatographic method for the characterization of linear fatty alcohols. *J. Am. Oil Chem. Soc.* 63(1); 1986; 95-7

A capillary gas chromatography (GC) method for the analysis of fatty alcohols is described. The method can separate fatty alcohols, fatty acids, hydrocarbons and fatty acid methyl esters containing 6 to 22 carbons, as well as fatty-fatty esters to 40 or more carbons. The precision of the method is better than 2% (rsd); accuracy, based on analyses of a standard mixture and a spiking/recovery experiment, is better than 3% (relative difference between known and measured). A calculated hydroxyl value based upon the GC data agrees well with the titrimetric hydroxyl value. AA

- 2425 BANNON (CD), CRASKE (JD) and HILLIKER (AE). Analysis of fatty acid methyl esters with high accuracy and reliability. V. Validation of theoretical relative response factors of unsaturated esters in the flame ionization detector. *J. Am. Oil Chem. Soc.* 63(1); 1986; 105-10

Because unsaturated fatty acid methyl esters (FAME) are subject to autoxidation, it is virtually impossible to obtain and maintain high purity standards. Accordingly, it is not possible to determine flame ionization detector response factors by the usual technique of analyzing standard mixtures of known composition. In an alternative approach, the response factors of methyl oleate, methyl linoleate, methyl linolenate, methyl arachidonate and methyl 4,7,10,13,16,19-docosahexaenoate relative to methyl stearate were estimated by determining the peak areas before and after quantitative hydrogenation in the presence of an internal standard. The estimates showed excellent agreement in all cases with the theoretical factors predicted by Ackman and Sipos and thus constitute an independent and unambiguous proof that the theoretical factors are highly accurate for all olefinic unsaturated FAME. Whereas it is common practice to determine an empirically derived correction factor for each FAME by analyzing standard mixtures of known composition, the thesis is now proposed that, both saturated and olefinic unsaturated FAME, the proper approach to accurate analysis requires that peak areas be corrected using the theoretical response factors as the only correction factors. If the correct result cannot be obtained when analyzing a primary standard of saturated FAME, it is an indication of faulty technique or equipment, and the only acceptable resolution of the problem is to locate and correct the fault(s). AA

- 2426 HEIN (H). Surface active derivatives of ricinoleic acid. *Fette Seifen Anstrichm.* 87(7); 1985; 283-9 (German)

- 2427 ZAJIC (J), SCHWARZ (W) and JELENOVA (B). Phase equilibria liquid/vapour in the system stearic acid- α -tocopherol. *Fette Seifen Anstrichm.* 87(7); 1985; 273-6 (German)

Sal fat

- 2428 BHATTACHARYA (DK), CHAKRABARTY (MM) and KAR (K). Acidolysis reaction of sal fat (*Shorea robusta*) with palmitic acid. *Fette Seifen Anstrichm.* 87(7); 1985; 278-82

SPICES AND CONDIMENTS

Bay leaves

- 2429 SAKAR (MK) and ENGELSHOWE (R). Tannin producing monomeric and dimeric substances in bay leaves (*Laurus nobilis* L.) *Z. Lebensmittel Unters. Forsch.* 180(6); 1985; 494-5 (German)

Paprika

- 2430 BOCK (W), POHL (A) and VUKOV (K). Liquefaction of paprika by the tomato mix-macerate process by use of the pectinolytic enzymes in the fruits. *Lebensmittelindustrie.* 32(2); 1985; 69-71 (German)

Thyme

- 2431 BESTMAN (HJ), ERLER (J) and VOSTROWSKY (O). Extraction of thyme with liquid CO_2 on a laboratory scale. *Z. Lebensmittel Unters. Forsch.* 180(6); 1985; 491-3 (German)

Turmeric

- 2432 BILLE (N), LARSEN (JC), HANSEN (EV) and WURTZEN (G). Subchronic oral toxicity of turmeric oleoresin in pigs. *Food Chem. Toxicol.* 23(11); 1985; 967-73

Eight pigs (males and females) were fed turmeric oleoresin at levels of 60, 296 and 1551 mg/kg body weight/day for 102-109 days. There was a reduction in weight gain and food conversion efficiency in the highest dose group. There were significant dose-related increases in weight of liver and thyroid at all dose levels. In two higher dose pericholangitis, hyperplasia of the thyroid and epithelial changes in kidney and urinary bladder were observed. It was not possible to establish a no adverse effect level on the basis of the observations in the experiment. Further studies were recommended to elucidate the mechanism of action of turmeric. MVG

SENSORY EVALUATION

- 2433 RISVIK (E) and CARDELLO (AV). Sensory attributes critical for the acceptance of low volume rations. *Activities Rep. R & D Assoc.* 38(1); 1986; 74-9

Discusses: How to describe food bars; descriptors to use; reduced profile; and industrial application. BSN

- 2434 NAGIN CHAND. Textural classification of foods based on Warner-Bratzler shear. *J. Food Sci. Technol. (India)* 23(1); 1986; 49-54

Foods including cereal foods, roti and biscuits, confectionery items, fruits and vegetables, candies, cheese and mutton have been classified into three groups based on the ratio of Warner-Bratzler shear stresses obtained by using horizontal (WBH, $kg \cdot cm^{-2}$) and traditional conical (WBC, $kg \cdot cm^{-2}$) blades, respectively. The first group comprise cohesive foods, where the shear ratio (WBH/WBC) is > 1.1 . The second group contains foods of snappy nature and the shear stress ratio lies between 0.9 and 1.1. Foods in the third group are crisp and the shear stress ratio is < 0.9 . Modified definitions have been proposed for cohesiveness, snappiness and crispness and conceptual relationships between cohesiveness, firmness, stickiness, toughness and chewiness have been indicated. KAR

- 2435 BENSON (PG) and OHTA (H). Classifying sensory inspectors with heterogeneous inspection - error probabilities. *J. Qual. Technol.* 18(2) 1986; 79-90

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

- 2436 SOM (NC), GHOSH (BB) and MAJUMDER (MK). Effects of *Bacillus thuringiensis* and insect pathogen, *Pseudomonas aeruginosa*, on mammalian gastrointestinal tract. *Indian J. Exp. Biol.* 24(2); 1986; 102-107
- Insect pathogen, *P. aeruginosa* L.V. caused accumulation of fluid in isolated guinea pig ileal loop. Histologically, villi appeared to be indistinct and other layers were found unaffected. Inoculation of *B. thuringiensis* TcSm (resistant to tetracycline and streptomycin) gave variable results. In case of positive response, villi were eroded and mucous layer was affected to some extent. In the experiments on susceptibility to host defence factors, antibiotic resistant variants of *B. thuringiensis* and parent strain, and also strain *P. aeruginosa* LV showed similar types of tolerance. Feeding experiment in mice indicated that *B. thuringiensis* TcSm or *P. aeruginosa* LV was not able to flourish in gastrointestinal tract. Even when these antibiotic resistant strains were administered orally along with antibiotic, survivality did not improve appreciably. No abnormality was noticed in gastrointestinal system or in any other organ during in vivo study. AA

BIOCHEMISTRY AND NUTRITION

- 2437 SCHNEEMAN (BO). Dietary fiber. Physical and chemical properties, methods of analysis, and physiological effects. *Food Technol.* 40(2); 1986; 104-10
- 2438 TOMA (RB) and CURTIS (DJ). Dietary fiber: Effect on mineral bioavailability. *Food Technol.* 40(2); 1986; 111-6
- Discussed are bioavailability of iron, zinc and calcium. KAR
- 2439 McNAUGHTON (JP), MORRISON (DD), HUHNER (LJ), EARNEST (MM), ELLIS (MA) and HOWELL (GL). Changes in total serum cholesterol levels of diabetics fed five grams guar gum daily. *Nutr. Rep. Int.* 31(3); 1985; 505-20
- Total serum cholesterol levels were reduced by the addition of 5 g guar gum and the decrease continued the 12 week period. Compared to initial levels, total serum cholesterol decreased by 7.3% after 4 weeks, decreased by 8.3 % after 8 weeks and decreased by 13.8% after 12 weeks when fed at 2.5 g/day. KAR
- 2440 WEST (KF) Jr. and SOMMER (A). Delivery of oral doses of vitamin A to prevent vitamin A deficiency and nutritional blindness (Review). *Food Rev. Int.* 1(2); 1985; 355-418
- 2441 HUANG (H-M), JOHANNING (GL) and O'DELL (BL). Phenolic acid content of food plants and possible nutritional implications. *J. Agric. Food Chem.* 34(1); 1986; 48-51
- The p-coumaric, ferulic, and caffeic acid contents of alfalfa

cabbage, and spinach were determined by gas chromatography after derivatization with N,N-bis(tri-methylsilyl)trifluoroacetamide. Total phenolic acids were estimated by extraction with 1% NaOH containing 0.5% NaBH₄. Free or nonesterified acids were extracted with 80% methanol. Alfalfa contained the highest concentration of total p-coumaric acid (1 mg/g) and of free caffeic acid (0.68 mg/g). Lower levels of free caffeic acid were found in cabbage and spinach but none in wheat bran. Wheat bran had the highest content of ferulic acid (4.4 mg/g). Only the free form of caffeic acid was found in alfalfa and cabbage, probably because the alkaline treatment destroyed all that was present. AA

- 2442 TONTISIRIN (K). The nutrition situation and nutrition action programs in four Asean countries. *Asian Food J.* 1(4); 1985; 162-8

Discusses the prevalence and severity of the problems of nutrition situation and assessment of action programmes in Thailand, Malaysia, Indonesia and the Philippines. BSN

- 2443 BIDLACK (WR), KIRSCH (A) and MESKIN (MS). Nutritional requirements of the elderly. *Food Technol.* 40(2); 1986; 61-70

Article covers aspects like the nutritional requirements including the recommended dietary allowances, calories, protein, carbohydrate, fat, fiber, vitamins, minerals and fluids. Efficacy of supplementation of vitamins and osteoporosis and calcium intake have also been dealt separately. KAR

- 2444 ASKEW (EW). Changing nutritional requirements for the armed forces of the future. Calorie dense or carbohydrate rich? *Activities Rep. R & D Assoc.* 38(1); 1986; 69-73

Discusses: Need for special purpose rations; importance of carbohydrate to work performance; adequacy of carbohydrate intake in soldiers fed the MRE ration during strenuous field exercise; and supplemental dietary carbohydrate in soldiers fed the MRE ration during strenuous work at high altitude. BSN

- 2445 ROKUS (MA), BUREMA (J), DEURENBERG (P) and WIEL-WETZELS (WAM Van Der). The impact of adjustment of a weight-height index (W/H²) for frame size on the prediction of body fatness. *Br. J. Nutr.* 54(2); 1985; 335-42

- 2446 GASSMAN (B). Vitamin supply and cancer risk. *Ernährungsforschung.* 31(1); 1986; 1-5 (German)

The author has discussed briefly the formation of radicals and peroxides in the physiological metabolic processes, and the anti-oxidative and radical-trapping role of vitamins. He has then mentioned the body's own oxidative defence systems, and the level of vitamin supply needed for cancer prevention. Finally, he has mentioned a few results obtained by experimentation on animals, and by epidemiological investigations. He concludes with the statement that very little is known about the human body's own protective systems against cancer. KMD

- 2447 BOLAND (RL). Plants as a source of vitamin D3 metabolites. *Nutr. Rev.* 44(1); 1986; 1-8

- 2448 KAMEI (M), FUJITA (T), KANBE (T), SASAKI (K), OSHIBA (K), OTANI (S), MATSUI-YUASA (I) and MORISAWA (S). The distribution and content of ubiquinone in foods. *Int. J. Vit. Nutr. Res.* 56(1); 1986; 57-63
- HPLC estimation of ubiquinone (UQ)-9 and UQ-10 content in different foods (cereals, vegetables and other products) has shown that corn oil and wheat germ contained large amounts of UQ-9 in particular, whereas meat, fish, pulses, nuts, dairy products and several vegeta-

bles showed the presence of UQ-10. Large amounts of UQ-10 were found in migratory fishes, rapeseed oil and soyabean. BSN

TISSUE CULTURE

Nil

TOXICOLOGY AND HYGIENE

- 2449 SALMINEN (S), SALMINEN (E), KOIVISTOINEN (P), BRIDGES (J) and MARKS (V). Gut microflora interactions with xylitol in the mouse, rat and man. *Food Chem. Toxicol.* 23(11); 1985; 985-90
Effects of xylitol administration on the quantity and quality of faecal microflora were studied in mice and human volunteers. In animals, effect of xylitol adaptation and 4-week xylitol feeding were examined. There were no significant changes in microflora was observed, but there was evidence of dose-dependent decrease in the number of aerobic streptococci. In animals, xylitol feeding, however, caused a shift in microbial population from gram-negative to gram-positive bacteria. A similar shift was observed in humans even after a 30 g oral dose. All animals showed a capacity to adapting to 20% xylitol and there was an accompanying enhancement of the ability of caecal and faecal flora to utilize xylitol. MVG
- 2450 BONFANTI (M), CASTELLI (MG), FANELLI (R) and AIROLDI (L). Enterohepatic recycling of N-nitrosodiethanolamine in rats. *Food Chem. Toxicol.* 23(11); 1985; 1011-13
- 2451 SPEIJERS (GJA), DANSE (LHJC), LEEUWEN (FXRVan) and LOEBER (JG). Four-week toxicity study of phenyl isothiocyanate in rats. *Food Chem. Toxicol.* 23(11); 1985; 1015-17
The objective of the study was to indicate whether or not isothionates could play a role in cardiotoxicity of rapeseed oil. Results were negative. MVG
- 2452 KOBUEKE (T), INAI (K), NAMBU (S), OHE (K), TAKEMOTO (T), MATSUKI (K), NISHINA (H), HUANG (IB) and TOKUOKA (S). Tumorigenicity study of disodium glycyrrhizinate. *Food Chem. Toxicol.* 23(11); 1985; 979-83
Results of the study with long term (110 weeks) administration by way of drinking water of 0.15 (maximum tolerated dose), 0.08, 0.04 or 0% to male mice and 0.3 (maximum tolerated dose) 0.15, 0.08 or 0% to female mice, did not reveal any evidence of chronic toxicity or tumorigenicity. MVG
- 2453 CABROL TELLE (A-M), SAINT BLANQUAT (G De), DERACHE (R), HOLLANDE (E), PERIQUET (B) and THOUVENOT (J-P). Nutritional and toxicological effects of long-term ingestion of phosphene-fumigated diet by the rat. *Food Chem. Toxicol.* 23(11); 1985; 100-19
- 2454 MORRISSEY (RE), NORRED (WP) and VESONDER (RF). Subchronic toxicity of vomitoxin in Sprague-Dawley rats. *Food Chem. Toxicol.* 23(11); 1985; 995-9
- 2455 TORRES (M), SANCHIS (V), RIBA (M) and CANELA (R). Simple method for determination of patulin production by *Penicillium griseofulvum* Dierckx. *Appl. Environ. Microbiol.* 51(1); 1986; 209-10

- 2456 MAHENDRA PRASAD, CHANDIRAMANI (NK) and MANDOKHOT (UV). Thermonuclease as an indicator of growth of *S. aureus* and production of enterotoxin. *J. Food Sci. Technol. (India)* 23(1); 1986; 1-5
- Enterotoxin and thermonuclease (TNase) production by *Staph. aureus* (FRI-100) was studied for 72 hours in ham, bacon, sausage and brain heart infusion broth medium at 25 and 37 C. Minimum cell population at which TNase could be detected varied between 2.1×10^6 and 4.9×10^7 /ml. Of the three substrates, TNase production was more in sausages at all doses of inoculum (inoculum level used were 5×10^3 , 10^3 , 10^4 and 10^5 /g) at both the temperatures. TNase production was more at 37 C. In ham and sausage, *Staph. aureus* population showed a steep rise upto 72 hours, whereas in bacon after 48 hours it declined. Correlation between the production of TNase and enterotoxin was observed in all the four substrates, irrespective of incubation temperature and level of inoculum, as both could be detected simultaneously in 95% of the samples. In the remaining samples, thermonuclease was detected earlier than enterotoxin. It is concluded that detection of TNase can be used as an indicator for the production of enterotoxin of *Staph. aureus* in ham, bacon and sausages. KAR
- 2457 FOSTER (GM). Socio-cultural practices affecting the safety of food. *Food Technol. Aust.* 37(7); 1985; 312-3
- The review covers aspects like, the role of the behavioural sciences in food safety programs, basic cultural views about foods; practices promoting food safety and practices promoting foodborne diseases. KAR

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